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DISEASES CAUSED BY BACTERIA AND FUNGI.

I. URBAIN, A., LANFRANCHI, F., & GORET, P. (1931). L'infection charbonneuse chez le Rat blanc. [**Anthrax Infection in the White Rat**].—*C. R. Soc. Biol. Paris*. **107.** 208-209.

II. URBAIN, A., LANFRANCHI, F., GORET, P., & LE ROUX, G. (1931). Vaccination du rat blanc contre le charbon bactéridien. [**Vaccination of the White Rat against** *B. anthracis*].—*Ibid.* 1259-1260. [1 ref.]

I. The adult rat possesses a high degree of resistance to the subcutaneous inoculation of *B. anthracis*, and tolerates 1 c.c. of a virulent culture. According to STRAUSS, rats so infected may suddenly succumb to the disease on being repeatedly inoculated. METCHNIKOFF and others found that, by passage through very young white rats, a strain regularly fatal to adult rats could be obtained, but that its virulence could not be greatly enhanced by this method. The authors inoculated the heart blood of animals killed by this means into Martin's broth and, using a dose of 1 c.c., increased the virulence in the course of 12 passages, so that 0·1 c.c. given subcutaneously usually killed adult rats.

Using a bovine strain very virulent for the rabbit, 0·5 c.c. of which killed a rat when given subcutaneously, the authors succeeded in killing rats with 0·01 c.c. after eight passages, but further passage had no effect. However, by the direct subcutaneous inoculation of normal rats with heart blood from rats killed by the above method it was found that, after the tenth passage, 0·0001 c.c. proved fatal and that, after the 60th passage, 0·00001 c.c. proved fatal. With strains of lower virulence the incubation period was from four to five days and, in the case of the hypervirulent strains, from 16 to 18 hours. A typical extensive, oedematous infiltration occurred at the site of inoculation and the enlarged spleen contained many bacilli though they were very scanty in the blood stream.

A reference is made to the very marked antagonism of staphylococci to *B. anthracis* : a mixture of 1 c.c. of staphylococci with from 100 to 200 M. L. D. of *B. anthracis* proved innocuous in the majority of cases ; *Bact. paratyphosum* B had no such influence.

II. This paper describes further experiments on the same lines as those referred to in the above article and also describes attempts to immunize by means of other methods of vaccination. The virulence of a certain strain was increased by inoculating heart blood from an infected rat subcutaneously into fresh rats so that after the 70th passage 0·000004 c.c. proved fatal.

The authors were unsuccessful in producing immunity by inoculating rats

subcutaneously with strains of low virulence and then testing with a more virulent strain, but an intradermal method is described in which a proportion of the rats in each batch inoculated are solidly immunized. In such animals the production of antibodies was poor, the agglutinating titre not exceeding 1 : 50. [It is assumed that the author is dealing only with white rats].—N. S. BARRON.

I. —. (1931). **Report of the Special Committee on Tuberculosis.**—*J. Amer. Vet. Med. Ass.* **79.** 526-529.

II. MALCOLM, P. (1932). **Problems of Tuberculosis Control and its Relation to Sanitary Science and Food Hygiene.**—*Ibid.* **80.** 96-99.

III. MARSHALL, C. J. (1932). **Progress in Controlling Bovine Tuberculosis.**—*Ibid.* 625-633.

I. This is the report of a special committee which " was appointed to confer with the Committee on Methods and Standards of the American Association of Medical Milk Commissions, to endeavour to have the Uniform Rules and Regulations for the establishment and maintenance of Tuberculosis-free herds of cattle under the Federal-State Accredited Herd Plan accepted as their methods and standards for Tuberculin-testing herds producing certified milk."

" On July 1, 1931, there were 1,222 counties, parts of two more, the District of Colombia, and fifty Vermont towns designated as modified accredited areas. About 30,000,000 cattle were under supervision for the control and eradication of bovine tuberculosis."

The control and eradication of avian tuberculosis in poultry and swine is now receiving increased attention as funds have been provided by Congress for this purpose.

The report gives a brief survey of the position as regards BCG vaccine.

" Independent investigators have shown that the virulence of BCG strains is not fixed and that by various ways and means, under artificial conditions of culture and by passage through experiment animals, the virulence of BCG may be greatly enhanced."

II. Malcolm discusses the value of the tuberculin test and states that, apart from human errors or unsuitable tuberculin, the test is 100 per cent. accurate.

III. Marshall deals with the progress made in America in controlling tuberculosis by means of tuberculin testing.

In referring to the BCG vaccine he says :—" It was looked upon with some favour by the International Veterinary Congress which met in London last year. The American methods in use up to the present time for controlling tuberculosis are considered to be too extravagant and wasteful for European conditions. If vaccination should be perfected to a point hoped for, it remains to be demonstrated whether it will be less expensive or more sure in its results than the tuberculin test has already been so well demonstrated to be with tuberculosis in this country."

—T. M. DOYLE.

FELDMAN, W. H., & MAGATH, T. B. (1931). **The Reliability of Guinea-Pig Inoculation in the Diagnosis of Tuberculosis.**—*Amer. Rev. Tuberc.* **24.** 312-325. 6 figs., 1 table. [5 refs.]

The authors have previously shown that in the spleens of guinea pigs infected with tubercle bacilli by intracerebral inoculation, histological lesions were found even when no gross lesions were evident. In view of this, they investigated the possibility of microscopic lesions of tuberculosis occurring in guinea pigs which would be considered normal on macroscopic examination.

Material from 158 cases of human tuberculosis, in which tubercle bacilli

were not detected by microscopic examination, was inoculated into guinea pigs. Two animals were used for each specimen, one being inoculated intraperitoneally and one subcutaneously. In 21 cases a diagnosis of tuberculosis was made from *post-mortem* examination of the guinea pigs. In the other cases the livers and spleens of 201 guinea pigs were examined histologically. All were found to be free from tuberculous lesions, but in 17 animals lesions of pseudotuberculosis were seen. On microscopical examination of stained sections these latter were seen to be different in histological appearance from tuberculous lesions and were free from acid-fast bacilli.

The authors conclude that failure to demonstrate tubercle bacilli in tubercle-like lesions in guinea pigs is presumptive evidence that the lesions are not those of tuberculosis. They also conclude that inoculation intraperitoneally and subcutaneously into guinea pigs and examination of the animals after eight weeks is a reliable procedure for the demonstration of tubercle bacilli in material in which the organisms cannot be found microscopically.—C. McG.

Belleflamme, M. (1931). Le diagnostic des tuberculoses animales par inoculation intraganglionnaire de produits suspects. [**The Diagnosis of Tuberculosis by Inoculation into Lymphatic Glands**].—*Ann. Méd. vét.* **76.** 415-420. [1 ref.]

The orthodox method of determining the presence of tubercle bacilli in suspected products by the subcutaneous or intraperitoneal inoculation of the guinea pig necessitates a considerable delay before a definite response can be obtained. With a view to a curtailment of this period, Ninni [see this *Bulletin.* **1.** 23.] suggested the injection of the material directly into the lymphatic glands of the guinea pig. He claimed that, in the case of positive samples, a response could be obtained between the eighth and twelfth day.

The author of this article has confirmed this observation. The material used in his series of experiments was obtained from several species of animal (cattle, pigs, a dog and a cat), and the specimens selected were those in which few or no tubercle bacilli were found by microscopical examination. The emulsions, in quantities of 0·2 c.c. to 0·3 c.c., were injected into the cervical lymphatic glands exposed by an incision through the skin over the side of the neck. The glands were removed 12 days later, thoroughly emulsified and examined microscopically. Out of 15 samples, 10 positive results were obtained. The author notes that the organisms were not scattered throughout the glands, but were collected into clumps.—R. E. Glover.

Poisson, H., & Buck, G. (1931). A propos d'un cas de tuberculose pulmonaire du Chat. [**A Case of Pulmonary Tuberculosis in a Cat**].—*Bull. Soc. Path. exot.* **24.** 861-863. [1 ref.]

The authors describe a case of pulmonary tuberculosis in a five-year-old cat in Madagascar. The lesions were confined to the lungs and associated lymph glands and to the pharangeal lymph glands. In the absence of adequate laboratory facilities it was not possible to determine the type of the tubercle bacillus isolated.
—T. M. Doyle.

I. van Deinse, F. (1931). Contribution à la mise en évidence rapide de l'ultravirus tuberculeux. [**A Rapid Method of demonstrating the Filtrable Form of the Tubercle Bacillus**].—*C. R. Soc. Biol. Paris.* **107.** 1058-1060. [2 refs.]

II. van Deinse, F. (1931). Influence d'une longue série de repiquages précoces

sur la virulence et sur la richesse en ultravirus d'une souche de Bacilles tuberculeux. [**Effect of Rapid Subculturing over a Long Period on the Virulence and Richness in Filtrable Virus of a Strain of Tubercle Bacillus**]. —*Ibid.* 1212-1214. [1 ref.]

I. Van Deinse has confirmed the observations of VALTIS and his co-workers that when filtrates of young cultures of tubercle bacilli are inoculated intraperitoneally into guinea pigs, the bacilli originating from the filtrate can be demonstrated 18 hours later in the mesenteric lymph glands and peritoneal exudate. As, however, the demonstration of the acid-fast bacilli frequently demands prolonged searching of the slides, van Deinse has attempted their concentration by various expedients. Their demonstration is facilitated in filtrates of tuberculous organs by the precipitation of the albumen by the addition of a few drops of a 20 per cent. solution of sulfo-salicylic acid. In filtrates of young surface growths on Sauton medium a precipitation of the calcium phosphate has been brought about by the addition of 12 drops of a 5 per cent. solution of disodium phosphate and 3 drops of a 5 per cent. solution of calcium chloride to 10 c.c. of filtrate.

It was observed that these inoculations were followed by the appearance in the peritoneal cavity of purulent points or by necrotic areas in which acid-fast bacilli were extremely numerous.

Van Deinse now produces these purulent points or areas by the intraperitoneal inoculation of precipitated calcium phosphate followed two days later by the filtrate under examination. It has been found that by this method enormous numbers of acid-fast bacilli can be demonstrated in pus smears of the mesentery and other parts of the peritoneal cavity.

II. Van Deinse has repeated the work of NÈGRE, BOQUET and VALTIS in which it was observed that subculture every fourth day of a bovine strain of tubercle bacillus on Sauton medium brought about a decrease in virulence. In van Deinse's experiments there was no appreciable decrease in virulence of the strain employed when tested on guinea pigs after 40 subcultures. After 98 subcultures there was some appreciable lowering of the virulence, but this was considerably less than reported by NÈGRE and his co-workers. It was found that this attenuated strain was not so rich in the filtrable virus form of the bacillus as the original virulent culture.—T. M. DOYLE.

I. MCALPINE, K. L., & MASUCCI, P. (1931). **Biochemical Studies of Bacterial Derivatives. XV. Changes in the Chemical and Biological Properties of Human Tubercle Bacillus Polysaccharide MB-200 produced by Mild Acid Hydrolysis.**—*Amer. Rev. Tuberc.* **24.** 729-736. 1 fig., 2 tables. [4 refs.]

II. MASUCCI, P., MCALPINE, K. L., & GLENN, J. T. (1931). **Biochemical Studies of Bacterial Derivatives. XVI. Some Differential Chemical Changes Accompanying the Growth of Human Tubercle Bacillus H37 and Bovine Tubercle Bacillus 523 Grown on Long's Synthetic Medium.**—*Ibid.* 737-745. 4 tables, 1 chart. [6 refs.]

III. BOISSEVAIN, C. H., & RYDER, C. T. (1931). **Some Observations on Chemical and Biological Properties of the Phosphatide from the Tubercle Bacillus.** —*Ibid.* 751-756. [5 refs.]

I. In previous papers the authors have described a method of isolating the specific soluble substance from the filtrate of cultures of a human tubercle bacillus grown on a synthetic medium [(1930). *Amer. Rev. Tuberc.* **22.** 669 and 678]. The present paper deals with further data regarding the chemical and biological characteristics of the polysaccharide. By subjecting it to mild acid hydrolysis it was found possible to split it into two fractions :—(1) an alcohol-insoluble fraction

—a white powder containing large amounts of combined mannose, with a low precipitin titre, and (2) an alcohol-soluble fraction—a bright yellow gum containing most of the arabinose, with a relatively high precipitin titre.

II. Comparative tests with a human strain and bovine strain of tubercle bacillus indicated that the precipitin titre of a filtrate from the human strain cultures was at least ten times that of the bovine filtrate against the same serum. This quantitative difference is attributed to the less amount of the reacting polysaccharide in the filtrates of the bovine culture and also to its rapid destruction. The amount of the pentose (arabinose) found in the bovine filtrate is about one third of that found in the human filtrate. As the pentose radicle gives the polysaccharide its activity when tested against the precipitating serum, a quantitative measure of the radicle is an index of the precipitin titre. Some evidence is adduced that a proportion of the pentose in the bovine filtrate is combined, thus reducing still further the reacting substance. The authors express the hope that, if these findings are substantiated by similar work on further strains, then the method may be of use in differentiating human from bovine strains of tubercle bacilli.

III. The authors point out that substances chemically pure are not necessarily biologically pure. The example given is that some of the properties ascribed to the polysaccharide from the tubercle bacillus have been found to be really due to the presence of small amounts of protein. They set out to prove that the phosphatide isolated by ANDERSON [(1927). *J. Biol. Chem.* **74.** 525.] presents another example and that its activity in causing the formation of tubercular tissue is due to an impurity. They agree that intraperitoneal injection of a phosphatide prepared according to ANDERSON'S directions causes the formation of tubercular tissue, but that it is impossible to free this substance from acid-fast bacilli and bacillary debris by centrifugation, precipitation or filtration of its ethereal solution. It was found possible to purify the phosphatide from bacteria and bacterial debris by dialysis of the ethereal solution and subsequent filtration. Intraperitoneal injection of the purified phosphatide caused no tubercular tissue nor the appearance of cutaneous hypersensitiveness.—R. LOVELL.

SPARTZ, L. (1931). Expectorations renfermant des bacilles de Koch, et absence de lésions tuberculeuses. [**Expectorations containing Tubercle Bacilli in the Absence of Tuberculous Lesions**].—*Bull. Acad. vét. France.* **4.** 333-335.

The author describes a case in which microscopical examination of the expectorations of a cow revealed a number of tubercle bacilli, although *post-mortem* examination showed no tuberculous lesions. The animal had severe bronchopneumonia, and the abundant tracheal secretions formed an excellent medium for the multiplication of any tubercle bacilli that were inhaled from a contaminated stable.—NORMAN HOLE.

I. BUXTON, J. B., & GRIFFITH, A. S. (1931). **The Use of BCG in the Vaccination of Calves against Tuberculosis.**—*2nd Rep. Direct. Inst. Anim. Path. Univ. Cambridge.* pp. 28-45. 6 tables. [22 refs.]

II. GRIFFITH, A. S., BUXTON, J. B., & GLOVER, R. E. (1931). **Further Results of Immunity Experiments on Calves with the BCG Vaccine.**—*Ibid.* pp. 46-52. 1 table.

I. This report has already been dealt with [see this *Bulletin.* **1.** 21]. Buxton and Griffith recorded the results of experiments carried out to test the degree of immunity conferred on calves by BCG vaccine against artificial infection. Preliminary experiments showed that intravenous inoculation produced the best

results and that two injections of the vaccine (10 mg. and 100 mg.) increased the strength and duration of the protection. The test dose consisted of the intravenous injection of from 0·25 mg. to 1 mg. of young cultures of virulent tubercle bacilli. The authors considered, however, that these doses were unduly severe and that more accurate information would probably be obtained by using smaller ones.

II. The report by Buxton, Griffith and Glover deals with a series of calves inoculated intravenously with two successive doses of BCG and tested subsequently for immunity by alimentary infection with virulent tubercle bacilli. In addition six out of eight vaccinated animals which survived from an earlier experiment are here reported on. Two of these animals are still alive and in good condition and have withstood an intravenous inoculation of 0·25 mg. and 1·0 mg. respectively of virulent tubercle bacilli. The remaining six calves were killed at various intervals after the administration of the test dose and the authors report on them as follows :—

" The following points are of especial interest in these six calves. The long duration of life—466, 570, 611, 616, 619, and 698 days—after a dose of bacilli which caused the death of untreated calves within 33 days. The slight amount of disease in the thoracic and abdominal organs—in one calf indeed no lesions at all were found except on the meninges—the lungs, which were the organs most severely affected in the controls, showed no lesions in five, and only seven small nodules in one of the vaccinated animals. The occurrence of tuberculosis of the central nervous system in each animal ; in one of the calves (No. 76) there was recent miliary tuberculosis of the meninges which appeared to be secondary to a caseous nodule over the fourth ventricle."

The second experiment comprised eight calves, non-reactors to the tuberculin test, six of which were given two intravenous injections (10 mg. and 100 mg.) of BCG and the remaining two animals were left as controls. Three months after the second dose of vaccine the eight calves were tested by the oral administration with a pipette of 5 mg. of virulent bovine tubercle bacilli.

The six vaccinated calves were autopsied at intervals of from 173 days to 204 days after the administration of the test dose. Four did not show any tuberculous lesions and two showed some slight doubtful lesions. The two control calves were killed 172 and 194 days respectively after the test dose and exhibited a moderate infection. This experiment indicates clearly that the double intravenous inoculation of BCG confers a complete immunity against the oral administration of virulent tubercle bacilli. The authors now propose to ascertain the duration of the immunity and the possibility of reinforcing a waning immunity with further doses of vaccine.—T. M. DOYLE.

I. CALMETTE, A. (1931). **Preventive Vaccination against Tuberculosis with BCG.**—*Proc. Roy. Soc. Med.* **24.** 1481-1490. 6 figs.

II. CALMETTE, A. (1931). **The Value of BCG Vaccination.**—*Brit. Med. J.* June 20th. 1070-1071.

At the meeting of the Royal Society of Medicine Professor Calmette delivered an address on the immunization of children with BCG vaccine.

He stated that his object and that of his veterinary colleague, M. GUÉRIN, had been to obtain a vaccinal attenuated strain of *fixed* virulence. Future generations will decide if the BCG fulfilled these requirements.

Vaccines containing heat-killed tubercle bacilli or bacillary extracts are incapable of producing active immunity, while spontaneously attenuated cultures are dangerous on account of their tendency to recover virulence.

Calmette sketched briefly the history of the thirty years' investigation which he and his colleagues have carried out on this difficult problem and described the early attempts to prepare vaccine with the human type of bacillus and with strains isolated from birds and from cold-blooded animals ; but it was not possible to prepare a satisfactory vaccine with any of these strains. It is now recognized that no antigenic value can be attributed to " paratubercle bacilli " such as FRIEDMANN'S tortoise bacillus.

Eventually a bovine strain was attenuated by 230 passages on an alkaline lipoid-containing culture medium consisting of potato soaked in ox-bile.

Calmette referred to those investigators who have expressed doubts as to the innocuity of the vaccine and pointed out that the researches undertaken in various parts of the world have proved that their fears were based on technical errors.

He referred to PETROFF'S claim that he had dissociated BCG into R and S colonies ; this can easily be accomplished, but in no other laboratory has it been possible to isolate a virulent S colony from pure BCG.

According to NEUFELD, both R and S types of colony obtained from PETROFF were found to be contaminated with virulent bacilli of the human type.

As regards DREYER'S claim to have obtained a virulent culture by the cultivation of BCG in the depths of peptonized glycerine veal broth, many workers had experimented with this method, but none had succeeded in exalting the virulence by deep cultures. Indeed ARLOING employed deep cultures to obtain attenuated tubercle bacilli for bovine vaccination. In considering the possibility of restoring the original virulence to BCG cultures, Calmette pointed out that in laboratories all over the world a large amount of research work had been devoted to this aspect of the problem, but that so far the most ingenious devices had failed to achieve this object. The author claimed that BCG confers a similar protection to that of a small virulent natural infection, but without the corresponding risk.

He considered that the fact that during the past seven years more than a million children had been vaccinated without any ill effects, was surely sufficient proof of the safety of the method.

II. In this editorial note the claims put forward by Calmette for the BCG vaccine are examined and criticized.—T. M. DOYLE.

NÈGRE, L., VALTIS, J., & LABERNADIE, V. (1931). Bacille paratuberculeux isolé des expectorations d'un malade atteint de lesions pulmonaires. [**A Para-Tubercle Bacillus isolated from the Expectorate of a Patient affected with Pulmonary Lesions**].—*C. R. Soc. Biol. Paris.* **107.** 1054-1056.

Repeated microscopic examination of the expectorate of a human patient who had been gassed during the war and was affected with abundant expectoration failed to reveal tubercle bacilli.

A sample of the expectorate was inoculated subcutaneously into three guinea pigs as a test for the presence of the filtrable virus of tuberculosis. When killed seven weeks later, two of the guinea pigs showed no lesions in the lymphatic glands, but in the third there was an abscess in the muscle at the site of inoculation and hypertrophy of the right sub-lumbar and bronchial lymphatic glands. As acid-fast bacilli could not be demonstrated in the lesions the glands were crushed and reinoculated subcutaneously into two guinea pigs. One of these showed lesions similar to those of the preceding guinea pig and the same picture was shown by animals of the third and fourth passages. As in all these animals microscopical examination of the pus failed to reveal acid-fast bacilli, a sample of pus was sown on Dorset-Petroff media and incubated at 37° C. The following day there was an abundant growth of an acid-fast bacillus which had all the characters of a para-

tubercle bacillus.

To produce lesions in guinea pigs, similar to those caused by the inoculation of the expectorate, it was necessary to inject at least 20 mg. of culture. During the early formation of the resulting abscess numerous acid-fast bacilli were present, but these gradually disappeared ; this explains the failure to find acid-fast bacilli in the guinea pigs inoculated with the expectorate. There was no evidence that the isolated acid-fast bacillus exercised any pathogenic effect on the patient. —T. M. Doyle.

Bull, L. B., & Dickinson, C. G. (1931). **Studies on Infection by and Resistance to the Preisz-Nocard Bacillus.**—*Austral. J. Exp. Biol. Med. Sci.* **8.** 45-52. [1 ref.]

The authors detail at some length their attempts to obtain a suspension of the organism which was and would remain free from clumps. The method which gave consistent results was as follows :—

A culture is made on hormone agar from a stock alkaline egg culture, and after 24 hours incubation this is again transferred to hormone agar. A solution of 0·1 per cent. sodium chloride adjusted to pH 8·9 is autoclaved at 115° C. for 20 minutes. Bile salt is prepared in 10 per cent. solution and sterilized at 115° C. This solution is added to the sodium chloride solution to give a concentration of 0·12 per cent. The final reaction is readjusted if necessary to pH 8·9 with sterile sodium carbonate solution. This solution is used to wash off the growth and the suspension is shaken three times in a mechanical shaker, being centrifuged twice between the shakings. Finally the suspension is filtered through paper (Postlip No. 6335).

Great difficulties have been experienced in ascertaining the exact number of organisms present in suspensions and also in making dilutions to certain accurate fractions of the original suspensions. No satisfactory method of surmounting the difficulties appears to have been found.—A. Leslie Sheather.

van Rackel, H. (1931). **Eleventh Annual Report on Eradication of Pullorum Disease in Massachusetts 1930-1931.**—*Massachusetts Agric. Expt. Sta. Control Ser. Bull.* No. 58. pp. 24. 1 fig., 8 tables, 13 photographs.

This is a popular leaflet on the control and eradication of bacillary white diarrhoea of chicks (*Bact. pullorum* infection).—T. M. Doyle.

I. Durant, A. J., & McDougle, H. S. (1931). **Chronic Pullorum Disease in an Adult Hen.**—*J. Amer. Vet. Med. Ass.* **79.** 646-648. 1 fig.

II. Stafseth, H. J., Thompson, W. W., & Grey, C. G. (1931). **Acute Pullorum Disease in an Adult Hen.**—*Ibid.* 818.

I. The authors record a case of chronic infection in a two-year-old hen caused by *Bact. pullorum.* On autopsy characteristic lesions of pullorum disease were discovered in the ovaries, while the pericardial sac was enlarged and contained both fluid and inspissated pus. Pure cultures of *Bact. pullorum* were obtained from the ovary and from the fluid in the pericardial sac. The authors state that chronic pullorum disease of the heart sac is frequently encountered in adult fowls and, although it occurs in both sexes, it appears to be somewhat more common in males.

II. An eighteen months old barred rock hen, recently returned from a laying trial where she had laid over 300 eggs, became drowsy, had greenish diarrhoea and a temperature of 109° F., death following two days later.

Autopsy showed oedema of the lungs, fibrinous exudate in the pleural cavity,

pericarditis, petechiae on the heart fat, swollen mahogany-coloured liver, pale spleen and ecchymotic haemorrhages in the intestinal mucous membrane. The blood serum gave a strongly positive reaction with *pullorum* antigen. Cultures of *Bact. pullorum* were obtained from the heart, liver and spleen.

[Other references occur in the literature to *Bact. pullorum* as the cause of death in adult fowls, but the evidence adduced is in most instances unconvincing. That adult fowls may die occasionally from this cause is a possibility which is difficult to refute, but on the other hand the *Bact. pullorum* infection may be, and probably usually is, secondary to some acute infection which has merely reactivated a chronic *pullorum* infection, similar to the manner in which an acute infection, such as swine fever, may reactivate a chronic *Bact. suipestifer* infection in pigs].—T. M. Doyle.

I. —. (1932). Circulaire de l'office vétérinaire fédéral relative à la prophylaxie de la diarrhée blanche des poussins. [**Circular of the Swiss Federal Veterinary Department regarding the Prophylaxis of Bacillary White Diarrhoea in Chickens**].—*Bull. Off. internat. Epiz.* **5.** 900-905.

II. Kernkamp, H. (1932). **The Hatchability of Eggs and the Livability of Chicks of Pullorum-Infected and Non-Infected Hens.**—*J. Amer. Vet. Med. Ass.* **80.** 229-235. 1 table. [6 refs.]

III. Shanks, P. L., & Gordon, J. M. (1932). **Blood-Testing and Egg-Production.**—*Vet. J.* **88.** 241-243. 2 tables. [9 refs.]

I. This is a general article dealing with the symptoms, lesions and control of bacillary white diarrhoea of chicks.

II. Kernkamp has confirmed the results of other investigators that normal hens give a higher egg yield than those affected with pullorum disease. There appeared to be no appreciable difference in the fertility of eggs produced by healthy and by infected hens, but the hatchability was higher with eggs from the non-infected stock.

The mortality among chicks bred from infected hens was 33·3 per cent. as compared with a mortality of 3·8 per cent. among chicks bred from non-infected stock.

III. Shanks and Gordon record that, in an egg-laying trial, birds which reacted positively to the agglutination test for *Bact. pullorum* laid only 142 eggs as compared with 204 eggs from non-reacting birds.—T. M. Doyle.

I. Biely, J. (1931). **The Constancy of Repeated Agglutination Tests in the Diagnosis of Pullorum Disease.**—*Canad. J. Res.* **5.** 693-706. 2 figs., 5 tables. [35 refs.]

II. Dearstyne, R. S. (1931). **Study of the Intermittent Reactor to the Agglutination Test for Pullorum Disease (Bacillary White Diarrhoea).**—*North Carolina Agric. Expt. Sta. Rep. 1930.* pp. 143-146.

I. Biely carried out a series of experiments which confirm the findings of other workers on the high accuracy of the agglutination test for the detection of fowls infected with *Bact. pullorum*. He found by repeated tests that few carrier fowls over one year of age overcome infection with *Bact. pullorum* and that, in the case of pullets just starting to lay, a small number make a complete recovery and cease to react to the test.

Healthy hens, when kept in contact with reactor hens, in the presence or absence of male birds, may contract infection, probably through the media of contaminated food or water. Infected male birds usually have a lower blood titre than infected hens, a fact which should be taken into consideration when

carrying out routine tests of infected flocks.

II. The object of this investigation was to study the cause and frequency of the intermittent reactor to the agglutination test for *Bact. pullorum* infection. According to Dearstyne, tests made on 27 birds, at 15-day intervals over a period of 36 months, showed that 12 (44 per cent.) reacted intermittently to the test. Details of the technique employed are not given.

[This is an important claim as the control of *Bact. pullorum* infection of chicks depends entirely on the detection of the adult carrier fowl by means of the agglutination test. The question has been the subject of many investigations and no reliable evidence has been found in support of the occurrence of intermittent reactors].—T. M. Doyle.

I. Biely, J., & Roach, W. (1932). **Comparison of Efficiency of the Rapid Whole Blood Agglutination Test with the Serum Agglutination Test for Pullorum Disease.**—*Canad. J. Res.* **6.** 381-386. 2 tables. [14 refs.]

II. Biely, J. (1932). **A Note on the Keeping Quality of Salmonella Pullorum Antigen.**—*J. Amer. Vet. Med. Ass.* **80.** 634-636. 1 table. [1 ref.]

I. The authors carried out comparative tests between the whole-blood agglutination test and the plate agglutination method for the detection of fowls affected with pullorum disease. Out of 2,932 fowls tested, the two methods failed to agree for 70 birds (2·3 per cent.), part of which discrepancy was attributed to the sensitiveness of one of the antigens employed. Not counting three flocks on which this particular antigen was used, there was an agreement of 98·7 per cent. between the two methods.

II. Biely found that *Bact. pullorum* antigen used in the plate agglutination test had lost none of its sensitiveness after 43 months in the ice-box.

—T. M. Doyle.

Clark, C. F. (1932). **Experiences in Eradicating Bang's Disease in Three Infected Herds of Cattle.**—*J. Amer. Vet. Med. Ass.* **81.** 54-61.

The purpose of this paper was to relate some experiences in attempting to eradicate Bang's disease and to discuss the significance of low agglutination titres and the frequency of abortions in negative animals. The three herds studied had been under the close observation of members of the Department of Animal Pathology, Michigan Agricultural Experiment Station, for several years, and Bang's disease had existed to a varying degree in each of them. The method used for testing was the frequent application of Huddleson and Abell's rapid-plate method of agglutination. In the three herds under observation the disease appeared to be eradicated by segregation of the positively reacting animals. The abortion rate of animals having a maximum agglutination titre of " trace or incomplete in 1 : 25 did not vary appreciably from those negative" ; in the three herds studied the abortion rate varied from 0 to 8·3 per cent. with a mean of 5·5 per cent.

—Ll. E. W. Bevan.

I. Bevan, Ll. E. W. (1931). **Notes on an Outbreak of Infectious Abortion.** —*Vet. J.* **87.** 580-583. 1 table.

II. Edington, B. H., & Braerman, A. (1931). **Bovine Infectious Abortion.**— *Ohio Agric. Expt. Sta. Bull.* No. 470. 158-161. 5 tables.

I. Bevan records good results in the immunization of cows against contagious bovine abortion in a heavily infected herd by means of a " devitalized vaccine " (" cultures of local strains of *Br. abortus* destroyed by exposure to chloroform "). In this herd it was impracticable to isolate completely the healthy from the infected

animals, yet none of the healthy animals contracted infection, while the " devitalized vaccine " apparently arrested the disease in the affected ones. The author states that the vaccine has been in use in Southern Rhodesia during the past ten years and that it has given highly satisfactory results.

II. Edington and Braerman carried out experiments to determine if abortion would be produced in heifers artificially infected with *Br. abortus* when sexually mature, but protected from additional infection for a period prior to breeding. The animals were infected either by feeding or by vaginal injection of cultures of *Br. abortus*.

It was found that abortion occurred in all animals which were infected after being bred and that no abortions occurred in the group of animals which were bred after infection.—T. M. Doyle.

Hadley, F. B., & Osborn, E. B. (1932). **Spontaneous Infection with Brucella abortus in the Bull.**—*J. Amer. Vet. Med. Ass.* **81.** 46-53. 2 tables. [11 refs.]

For many years the question has been debated as to whether bulls from abortion-infected herds, more especially bulls that react to the serologic tests for *Br. abortus*, are capable of transmitting the infection to cattle in clean or non-reacting herds. In the above article the writers review the literature on this subject from which " it seems to be the concensus of opinion that while the bull may be a passive carrier of the infection, he seldom becomes actively infected and even then is not likely to serve as a spreader." From their own observations of two suitable bulls and from the results of those of others who have studied brucella infections, the writers came to the following conclusions :—

" 1. Testicle infection with *Brucella abortus* occurs in the bull from having acquired the organism by natural contacts.

" 2. Bulls discharging *Brucella abortus* in their semen are not necessarily capable of infecting susceptible cows which they serve.

" 3. Bulls may be used for years in badly infected herds, yet not acquire the infection.

" 4. The fact that a bull reacts to the blood test for abortion infection is not conclusive evidence that *Brucella abortus* is being eliminated in his semen.

" 5. The higher the agglutination titre in a bull, the greater the possibility of his having an active infection in some organ of the uro-genital system."

—Ll. E. W. Bevan.

Leifson, E. (1931). **The Fermentation of Organic Acids by Brucella.**—*25th Proc. Amer. Ass. Med. Milk Comm.* pp. 86-88.

The author reports on the reaction of 29 strains of brucella to various organic acids. The potassium salts of the various acids were added to the media, in a concentration of from 0·3 to 0·4 per cent., with brom-thymol-blue as an indicator. In infusion broth media great differences in reaction were obtained with different strains, but little correlation was found between the change of the reaction and the source of the organisms except with two of the acids. In the case of propionic acid all the bovine strains of *Br. abortus* gave some indication of acid production and after six to ten days the medium was neutral. *Br. melitensis* turned the medium very alkaline, whilst four strains of porcine origin turned the medium alkaline and five strains left it neutral. In the case of pyruvic acid there was some indication of acid production by bovine strains, but not by porcine strains nor by *Br. melitensis*. The author points out that the results are not final and that they have not been sufficiently confirmed to be conclusive.—R. Lovell.

I. Huddleson, I. F. (1931). **Differentiation of the Species of the Genus Brucella.**—*Amer. J. Publ. Health.* **21.** 491-498. 1 table. [10 refs.]

II. Olitzki, L., & Gurevitsch, J. (1932). Das Wachstum der Brucellen auf halbfesten Nährböden. [**The Growth of Brucella on Semi-Solid Media**]. —*Zlb. Bakt. I.* (*Orig.*). **125.** 171-180. 1 fig., 9 tables. [3 refs.]

I. A total of 656 strains of brucella from Europe and North America were studied in their growth behaviour toward aniline dyes in a suitable medium. It was found that these strains could be divided into three groups or species according to the growth inhibiting action of thionin in a final dilution of 1 : 30,000 and of pyronin in a final dilution of 1 : 200,000 in beef-liver infusion agar at a pH of 6·6. Of the total number, 133 were classified as *Br. melitensis*, 352 as *Br. abortus* and 172 as porcine strains. *Br. melitensis* grew on both the thionin and pyronin dye media, while *Br. abortus* grew only on the one containing pyronin and the porcine strains only on the one containing thionin.

II. The author found that a useful distinction between members of the brucella group could be made by growth in a semi-solid medium containing 0·5 per cent. agar. After 48 hours incubation both *Br. melitensis* and *Br. abortus* grew in the form of a ring a few millimetres below the surface but, by the sixth day, the growth of *Br. abortus* had spread to the surface of the medium. A higher agar dilution or the addition of glycerol caused the primary zone to appear at a greater distance from the surface, whereas the addition of a strongly reducing substance like cystein prevented growth in the deeper layers. The authors conclude that a certain amount of oxygen is necessary for the growth of brucella and that in the presence of 10 per cent. carbon dioxide maximum growth is obtained.

—S. J. Edwards.

Donham, C. R., & Fitch, C. P. (1932). **The Relation of the Time Element to the Results obtained by the Rapid Agglutination Test for the Diagnosis of Bang's Disease.**—*J. Amer. Vet. Med. Ass.* **80.** 839-847. 4 tables. [2 refs.]

It is generally considered that an interval of from two to five minutes after mixing the serum and antigen is sufficient before reading the results of the rapid (plate) agglutination test for the detection of cows affected with contagious abortion. Donham and Fitch have shown that with a small percentage of sera this interval is not sufficient and consider that if it is strictly adhered to some affected animals may escape detection. Although the rapidity of agglutination varies with different antigens, yet some samples of sera gave slow reactions with 13 different antigens. The addition of gum arabic to the antigens appeared to speed up the reactions.

Pending the solution of this difficulty the authors have adopted an arbitrary time interval of from eight to ten minutes for rapid tests.

It is pointed out that if rapid tests are held for eight to ten minutes before they are read, the method has no advantage in economy of time over the test tube method for the routine *laboratory* diagnosis of contagious abortion.

—T. M. Doyle.

Donham, C. R., & Fitch, C. P. (1932). **Agglutination Test in the Diagnosis of Infectious Abortion in Cattle (Bang's Disease).**—*J. Infect. Dis.* **51.** 162-190. 13 tables. [11 refs.]

The authors investigated discrepancies reported by various authors in the results obtained by the rapid agglutination test recommended by Huddleson and Abell and those obtained by the usual test tube method. Using the rapid method, they found discrepancies in the results of different technicians testing the same samples and even in the results obtained by the same technician testing duplicate

samples with the same antigen. The discrepancies were met with principally in sera with an agglutinating titre of 1 : 25 to 1 : 100. It was in the case of sera with the same titre range that there was disagreement between the results obtained with the rapid method and with the test tube method, and also in the results obtained by different technicians testing duplicate samples by the test tube method. Sera with the above range comprise 5 to 6 per cent. of the total samples received in routine diagnosis work.

Commercial antigens were found to show variations of from 2 to 17 per cent. in bacterial concentration, but their variation in sensitivity did not appear to depend on bacterial concentration. In tests with ranges of bacterial concentrations there was a slightly higher titre with the more dilute suspensions, but no special sensitivity at any particular strength. With variations in the concentration of saline from 0·85 to 15 per cent. there was no significant difference in the sensitivity of antigens used in the rapid test.

When serum-antigen mixtures were diluted with saline in the rapid test before agglutination occurred, the titre of the serum was diminished. The authors also found that the titre of a serum with the rapid test was usually greater than that by the test tube method. They consider that the difference is due to the relatively small quantity of saline required to suspend the thick bacterial suspension used in the rapid test. Dilution with negative bovine serum instead of saline did not reduce the agglutinability more than was to be expected from the dilution of the agglutinins. Indeed, the larger amount of serum, apart from agglutinin content, appeared to favour the agglutination reaction.

Saline, therefore, has an inhibitory effect on the agglutination of the bacteria and the less saline used within limits in the preparation of the rapid antigens, the more satisfactory these will be.—A. Brownlee.

Boak, Ruth A., & Carpenter, C. M. (1931). **Lethal Temperatures for Porcine Strains of Brucella abortus.**—*J. Infect. Dis.* **49.** 185-188. 1 table. [9 refs.]

The results of careful investigations indicated that the present requirements of the majority of States in America for the pasteurization of milk, namely, heating at from 142° to 145° F. for from 20 to 30 minutes, are adequate for destroying the most virulent strains of *Br. abortus*.—Ll. E. W. Bevan.

Emmell, M. W., & Huddleson, I. F. (1931). **The Susceptibility of the Guinea Fowl to Brucella Disease.**—*J. Amer. Vet. Med. Ass.* **79.** 228-232. 1 table. [5 refs.]

The authors have previously reported on the pathogenicity of brucella organisms for the fowl and have described cases of natural infection. The present paper deals with the results of experiments in which guinea-fowls were infected by feeding with the three different types of brucella. It is shown that specific agglutinins can be present three weeks after infection although in the case of the porcine strain and *Br. melitensis* the peak of the agglutination titre is reached before this time. The birds showed symptoms of emaciation, paleness of the head, comb and wattles, and occasional diarrhoea during the period of observation (120 days). *Post-mortem* examination of birds killed in the early stages of the infection showed well-marked lesions in the spleen, liver, kidneys and intestines, but after 90 days these lesions tended to disappear.

Natural infection was found to be present in two guinea-fowls which had been in close contact with a herd of pigs heavily infected with brucella. Agglutination tests showed the blood sera of these birds to react in dilutions of 1 : 25, but brucella organisms could not be recovered from their organs. The *post-mortem* lesions

were similar to those present in experimentally infected guinea-fowls.
—S. J. EDWARDS.

VON BIELING, R. (1930). Untersuchungen über die Erreger des undulierenden Fiebers. **[Investigations regarding the Cause of Undulant Fever].**—*Zschr. Hyg. u. Infektkr.* **111.** 728-739. 8 tables. [13 refs.]

Using the agglutination-absorption test, the author was able to distinguish 23 brucella strains isolated from cattle affected with contagious abortion in Germany from 16 strains recovered from cases of undulant fever in Palestine. Two strains originating from cattle in the latter country were found to be serologically identical with the human type. Again, it was found that strains responsible for undulant fever in Germany were similar to the bovine strains. Results therefore show that the brucella strains examined by the author fell into two types :—(a) an *abortus* type originating from cases of infectious abortion in cattle in Germany which may also be responsible for undulant fever in man and (b) a *melitensis* type which causes undulant fever in Palestine and can produce abortion in cattle.
—S. J. EDWARDS.

I. DALRYMPLE-CHAMPNEYS, W. (1932). **Undulant Fever. A Clinical Review.** *Lancet.* **222.** 791-793.

II. —. (1932). **Undulant Fever.**—*Ibid.* 994-995. [2 refs.]

I. The first article is an abridged report from a paper read before the Paget Club, St. Bartholomew's Hospital. It gives a brief review of the history of the of the disease known as undulant fever, from its identification as a clinical entity by MARSTON in 1861 up to the present time. It discusses the incidence of cases occurring in Denmark, the United States of America, Canada, Sweden, Poland, Switzerland, Holland and Great Britain. It points out that the disease is commoner in males than in females, that it most often attacks those between the ages of 15 and 45 and that it is very uncommon in children under five years of age. It describes the most helpful points in clinical diagnosis and states that in laboratory diagnosis positive agglutination to a titre of at least 1 : 100 is nearly always present and that blood culture is not always easy. The author is unable to explain the curious discrepancy between the widespread infection of the milk supply and the small number of human cases reported.

II. This leading article reviews the present knowledge concerning the extent of undulant fever in Great Britain and discusses the many problems presented by the disease. It admits that in man the clinical symptoms are so little characteristic that it is wrongly diagnosed as influenza, tuberculosis, enteric fever, appendicitis, rheumatism, broncho-pneumonia, or some other condition. It refers to the uncertainty as to the usual mode of infection and points out that milk is frequently incriminated although, both in Scotland and England, undulant fever has been observed in town patients consuming very little raw milk and then only in tea or coffee. How infection occurs in such cases is puzzling and it is suggested that most people who drink infected milk do not develop active infection. It is postulated that some peculiar factors are necessary before the disease can develop in its typical form. Attention is drawn to the fact that in the United States of America, particularly in the middle west, hogs are very frequently responsible for human infection, but that in Great Britain, no case of *abortus* infection in pigs has yet been recorded.—LL. E. W. BEVAN.

GARDNER, A. D., GIRDLESTONE, G. R., & GILLESPIE, N. A. (1932). **Bone Abscesses Due to Brucella melitensis.**—*Brit. Med. J.* July 9th. 53-54.

2 tables. [6 refs.]

The occurrence of arthropathies and hydrarthroses complicating Mediterranean fever has been extensively noted in the medical press. The writers report a case in which osteitis and hydrarthrosis co-existed in the same patient. As the result of agglutination and culture tests they came to the conclusion that both bone and joint lesions were complications of a *Br. melitensis* infection.

—Ll. E. W. Bevan.

Hay, Hilda R. (1932). **A Study of the Bacillus mucosus capsulatus Group.**—*J. Hyg. Cambridge.* **32.** 240-257. 4 tables. [24 refs.]

This study was undertaken to determine the relationship between *Bact. lactis aerogenes* and the Gram-negative encapsulated bacillus associated with infections of the human respiratory tract (Friedländer's bacillus). A large number of strains were examined, having been isolated from normal human faeces, diarrhoeal faeces, sputum, milk samples and flies, and a few from urine. It was unfortunate that no strains were isolated from soil although 11 samples were examined. Using the term *B. mucosus capsulatus* " R," the author defines a group of organisms whose main distinguishing feature, apart from encapsulation, is the ability to ferment inosite. *Bact. lactis aerogenes* possesses these essentials. The strains isolated from human cases of enteritis give similar biochemical reactions to strains from sputum and other non-faecal sources, but they show less resemblance to strains from normal faeces. It is pointed out that certain coliform types such as *Bact. acidi lactici*, *Bact. cloacae*, *Bact. neapolitanum*, and *Bact. coli* (*communior*) may resemble *B. mucosus capsulatus* in culture, but fail to ferment inosite. These and the latter utilize citrate. The author did not appear to find the indol and VP tests so useful for classification, for, of 26 " enteritis " strains tested, 21 were VP-positive and 5 produced indol, against 9 of 19 " normal faecal " strains which were VP-positive and 11 which were indol-positive. A few serological tests suggested that faecal (*Bact. lactis aerogenes*) and non-faecal (Friedländer's bacillus) types existed although there is some serological relationship between them. The author emphasizes that *B. mucosus capsulatus* giving VP + indol-citrate + reactions occur in human faeces and that the finding of such strains does not necessarily indicate freedom of that particular environment from faecal contamination. [Gray. (1932). *J. Hyg. Cambridge.* **32.** 132. pays attention to the proportion of *Bact. aerogenes* to *Bact. coli* in the examination of water].—R. Lovell.

Hendrickson, J. M., & Hilbert, K. F. (1932). **The Persistence of Pasteurella avicida in the Blood and Organs of Fowls with Spontaneous Fowl Cholera.**—*J. Infect. Dis.* **50.** 89-97. 7 tables.

The authors were dealing with natural cases of fowl cholera, the birds being removed from the flock as soon as symptoms were noticed and placed in separate cages. The reports show that the organism was frequently obtained in cultures from the blood for a period of one to four days and in one case 49 days preceding death, showing a progressive multiplication in the blood for several days before death. The causal organism was not found regularly in the nasal cleft or the upper portion of the trachea.

The organism multiplies rapidly in the blood stream and the tissues immediately preceding and after death. Agglutinins can only be determined in low dilutions of the serum.—Norman Dobson.

Wilsdon, A. J. (1931). **Observations on the Classification of Bacillus welchii.**—*2nd Rep. Direct. Inst. Anim. Path. Univ. Cambridge.* pp. 53-85. 2 figs.

on 1 plate, 11 tables. [44 refs.]

The group of anaerobic bacteria known under the name of *B. welchii* (*Clostridium welchii*) has been studied with a view to finding a satisfactory basis for classification. It is pointed out that in addition to the modal forms, *Cl. welchii* may vary from coccoid forms to long filaments. This pleomorphism is more common on certain media such as solid serum. On similar media and also on alkaline egg, large oval spores may be formed. Motile forms were never observed.

The question of proteolysis is discussed and in 25 of 37 strains this was apparent when grown on solid horse serum, although the author states that there is no ground for separating the typical *Cl. welchii* from the lamb dysentery bacillus on this basis. Similar criticisms are levelled at the reactions in alkaline egg media, the fermentation of glycerol, the formation of acrolein and the fermentation of salicin.

Eleven samples of agglutinating sera were prepared and a series of agglutination reactions showed that there was little likelihood of formulating a satisfactory classification of the members of the group on this basis.

Accordingly toxins and corresponding antitoxic sera were prepared and cross-protection experiments carried out. The author thus classifies his strains into four types which he names A, B, C and D.

Type A toxin corresponded to that originally described in connection with strains of *Cl. welchii* isolated from human cases of gas gangrene. In peptic digest broth the maximum amount of toxin appeared in from 18 to 24 hours, and was thermolabile and haemolytic. The corresponding antitoxin neutralized toxin A only.

Type B toxin appeared identical with that produced by the lamb dysentery bacillus, was thermolabile and haemolytic. The corresponding antitoxin neutralized toxins produced by types A, B, C and D.

Type C toxin appeared similar to that produced by *Cl. paludis*, was thermolabile and haemolytic. Its corresponding antitoxin neutralized toxins produced by types A, B and C.

Type D toxin was produced by strains of animal origin and differed in that its maximum concentration was not reached till cultivation had proceeded for from three to five days. It was heat stable, for heating for one hour at 100° C. did not completely destroy it. It appeared to be slightly haemolytic. Its corresponding antitoxin neutralized toxins produced by Types A and D.

This group of organisms is therefore classified by the author according to their toxigenicity although the terms " serological " and " antigenic " used in such reactions are apt to lead to confusion. He advocates the discontinuance of such terms as " L. D." bacillus and *Cl. paludis* affirming that they are unnecessary and likely to confuse.—R. Lovell.

Gustafson, F. (1932). Några ord om anaeroba förruttnelsebaciller (bacillus putrificus, Bienstock) ur födoämneshygienisk synpunkt. [**A Note on Anaerobic Putrefaction Bacilli** (*Clostridium putrificum* **Bienstock**) **from the Point of View of Food Hygiene**].—*Skand. Vet.-tidskr.* **22.** 50-54. [1 ref.] [Summary in English : abst. from orig.]

On examination of food in connection with meat poisoning, the author has in nine cases proved *Clostridium putrificum* Bienstock to be the probable cause of the trouble. Pork, veal and beef have been the source of infection. Most cases of meat poisoning have consisted of " mass illness " (i.e. illness affecting whole families) with vomiting, diarrhoea and headache, but no deaths. The author supposes that, in the case of pig products, the carcasses have been soiled in the course of the

scalding.

After slaughter the carcasses have probably immediately been moved into the refrigerating hall without first being cut up and sufficiently dried. The bacilli seem to thrive exceedingly on this process.—N. LAGERLÖF (STOCKHOLM).

BARBER, C. (1931). Etude comparative des cendres de certaines espèces microbiennes. **[The Inorganic Constituents of Certain Bacteria].**—*C. R. Soc. Biol. Paris.* **108.** 317-319. 3 tables.

The total ash content and the actual amount of the following elements, viz. potassium, sodium, calcium, magnesium, iron and phosphorus, present in certain bacteria are given. The bacteria included rough and smooth pathogenic *B. anthracis*, two non-pathogenic *B. anthracis* and rough, smooth and non-agglutinable forms of cholera vibrio. From the figures it is concluded that the amount of potassium and sodium in these organisms is particularly high when compared with the values for the other elements. A marked difference is found between the rough and smooth forms, the former containing a higher mineral content, especially in potassium, calcium and magnesium. The virulent forms of the anthrax bacillus contain a greater ash content than the attenuated forms. [The number of different strains examined in this study does not warrant the above conclusions. Until analyses of many more organisms and strains are published these conclusions must be regarded as very tentative].—W. R. WOOLDRIDGE.

VON KRAUS, K. (1932). Bakterien im elektrischen Kraftfeld. **[Bacteria in an Electrostatic Field].**—*Zlb. Bakt. I.* (*Orig.*). **124.** 64-77. 15 tables. [37 refs.]

The author provides a brief review of literature on the behaviour of bacteria towards electricity, pointing out that although numerous experiments have been conducted on the actual passage of electric current through media containing bacteria, leading to the general conclusion that effects are secondary and due to heating or formation of decomposition products around the electrodes (e.g. chlorine at the anode from sodium chloride in the medium), no reliable records seem to exist on the effects of an electrostatic field, i.e. when the lines of force traverse the medium without actual passage of current.

He therefore conducted experiments by arranging a powerful field generated by a motor-driven influence machine, the ball conductors of which were connected to two parallel metal plates set at such a distance (4 to 5 cm.) as to maintain a potential difference of 71,900 to 76,800 volts. The plates were placed within an earthed Faraday cage and the leads duly insulated.

Bouillon cultures, contained in Schleicher and Schull diffusion shells so as to obviate interference with the electrostatic field, were exposed for periods up to 48 hours between the plates, control cultures being again surrounded with a Faraday cage [presumably tin-foil] to eliminate the lines of force but leave temperature conditions comparable.

Bacillus subtilis, *Staphylococcus haemolyticus aureus*, *Corynebacterium diphtheriae*, *Bacterium coli*, and *Bact. typhosum* Eberth-Gaffky, served as representative organisms.

No effect was exercised by the electric field either on growth or on biological behaviour.—H. H. GREEN.

GIBBS, C. S. (1931). **Saprophytic and Secondary Microörganisms occurring in the Respiratory Tracts of Domestic Fowls and Chickens in Health and in Disease.**—*J. Bact.* **21.** 97-109. 4 figs. [2 refs.]

The author made a bacteriological survey of the larynx, trachea, bronchi and lungs of 56 adult fowls and 14 chickens aged about six weeks. Ten of these were in normal health and 60 were found to be affected with disease as follows :– laryngotracheitis, 42 ; pullorum disease, 6; chronic laryngitis, 7; avian paralysis, 5.

A variety of organisms, including a spirochaete, were isolated from the respiratory tract of fowls affected with laryngotracheitis, but none were pathogenic and there was no evidence that any one was the primary cause of the disease. [It is now generally accepted that laryngotracheitis is caused by a virus]. *Bact. pullorum* was not isolated from the respiratory tract of fowls affected with pullorum disease.

Staphylococci were isolated from the respiratory tract of 73 per cent. of birds affected with laryngotracheitis, from 57 per cent. of those affected with chronic laryngitis and from 40 per cent. of the healthy controls.

Spirochaetes were found in 50 per cent. of birds affected with laryngotracheitis, in 100 per cent. of birds with chronic laryngitis, in 40 per cent. of fowls affected with avian paralysis and in 30 per cent. of healthy controls.

In two cases of laryngotracheitis, haemolytic streptococci were isolated from the inflammatory exudate present in the larynx and trachea.—T. M. Doyle.

DISEASES CAUSED BY PROTOZOAN PARASITES.

Carson, J. F. (1932). **Experiments on the Transmission of *Trypanosoma brucei* and *Trypanosoma rhodesiense* to Man.**—*Ann. Trop. Med. & Parasitol.* **26.** 109-115. 1 table.

One of the chief problems in the study of human trypanosomiasis is the relationship between the two types of parasite infecting man—*T. gambiense* and *T. rhodesiense*—and *T. brucei* a parasite of animals.

Three questions require investigation. These are :—(1) does *T. gambiense* change its distinguishing characters by repeated cyclical passage through such flies as *G. morsitans*, *G. pallidipes* and *G. swynnertoni* ; (2) can *T. rhodesiense* become *T. brucei* and (3) can *T. brucei* become *T. rhodesiense*.

The author has carried out tests with a strain designated *T. brucei* which was obtained from a cow by Hornby. It is noteworthy that Hornby in his annual report suggested that this strain might be *T. rhodesiense* because the infection apparently occurred in the Kahama district early in 1927. The author states that sleeping sickness was not found in that district until early in 1928 and draws the conclusion that the chances of this strain having previously infected man are very slight.

Flies were fed upon guinea pigs harbouring the strain and then transferred to clean guinea pigs which became infected. The author then fed some of the flies upon himself. Some of these were again fed upon guinea pigs, with a proportion of positive results. The remaining flies were then fed upon a second volunteer and the last remnant of them upon guinea pigs and again the infectivity of a proportion of the flies was established. Neither of the human beings became infected. This strain had been kept in animals for four and a half years and it is noteworthy that it was readily transmitted by flies to guinea pigs.

A strain of *T. rhodesiense* which had been maintained for 19 months in sheep and goats was transmitted to guinea pigs by flies. The author inoculated himself subcutaneously with blood from a guinea pig and became infected. The author's infection was transferred to rats by inoculation.

There was no evidence that *T. rhodesiense* had been converted into *T. brucei*

by the animal passages extending over 19 months. Domesticated animals must be taken into account as possible sources of sleeping sickness infection.

—A. Leslie Sheather.

Sergent, E., Donatien, A., Parrot, L., & Lestoquard, F. (1931). La prémunition contre les piroplasmoses bovines dans l'Afrique du Nord. [**Premunition against Bovine Piroplasmosis in North Africa**].—*Ann. Inst. Pasteur.* **47.** 63-72. [3 refs.]

Jouvre, F., Fournel, H., & Bertrand, G. (1931). Babésiellose bovine dans la Basse-Auvergne. [**Bovine Babesiasis in the Basse-Auvergne**].—*C. R. Soc. Biol. Paris.* **107.** 9-11.

The first paper describes the method of protecting cattle against piroplasmosis in Algeria and Morocco. Virus-vaccines against *Babesia bigemina* and *B. berbera* consist of blood drawn from animals which are carriers of pure strains of the respective organisms. The vaccine for anaplasms consists of the blood drawn from an ox six days after inoculation with a strain of *A. marginale*. These three vaccines are given together in November or December and the vaccine for theileriasis is given in the following spring. The latter consists of the blood of an ox in the stage of acute reaction to inoculation with a mild strain of *Theileria dispar*. Results are given of the vaccination of 715 cattle in 1927–1928, 1,125 cattle in 1928–1929 and 1,709 cattle in 1929–1930. The loss from the first vaccination varied from 0 to 1·5 per cent. and from the vaccination against theileriasis from 0·2 to 5·3 per cent. When the cattle were exposed to natural infection occasional losses occurred from theileriasis, but these did not exceed 0·5 per cent. whilst, in unprotected cattle in the same area, losses varying from 20 to 80 per cent. were experienced.

The second paper records the existence of *Babesia bovis* in the Basse-Auvergne. Peracute, acute and chronic forms are described and it is pointed out that the former may simulate anthrax. One animal suffering from a peracute attack recovered after treatment with trypan blue. Acute cases showed fever, colic, diarrhoea and prostration, but usually recovered ; chronic cases showed profuse diarrhoea simulating Johne's disease and in the case described the animal died in 15 days.

—U. F. Richardson.

I. Jaume, G. (1932). Un cas de leishmaniose naturelle généralisée chez le chien au Maroc. [**A Case of naturally occurring Generalized Leishmaniasis in a Dog in Morocco**].—*Bull. Soc. Path. exot.* **25.** 225-227. 1 plate.

II. Velu, H., Eyraud, E., & Petitdidier. (1932). Recherches sur la leishmaniose canine dans la région de Casablanca, et sur la valeur de la formol-gélification comme méthode de diagnostic. [**Investigations regarding Canine Leishmaniasis in the Neighbourhood of Casablanca, and the Value of the Formol-Gel Test for Diagnosis**].—*Ibid.* 227-230. 1 table. [14 refs.]

I. The author describes a case of generalized leishmaniasis in a four-year-old wire-haired fox-terrier at Casablanca. The dog was brought to the town in June, 1931, when it appeared to be in perfect health. It was observed to be ill about the middle of October and survived until February 9th, 1932. Wasting was the first symptom observed and about the same time abscesses occurred around the base of the penis. Within a month there was marked emaciation and the animal was unable to walk steadily. The appetite was variable and there was an intermittent fever. Marked alopecia then developed in the neighbourhood of the ears and the skin presented an eczematous appearance. Nodules were discovered on other parts of the body and these burst in the course of a few days forming ulcers with prominent margins. Treatment [unspecified] was without result.

At the *post-mortem* examination there was found enlargement of the spleen, congestion of the kidneys, swelling of the lymphatic glands and the bone marrow was red and diffluent. Microscopic examination showed that parasites were present in liver, spleen and bone marrow.

The case is remarkable in that the lesions of kala azar and oriental sore were present simultaneously; it is further important because the author is of the opinion that the infection occurred locally, after the dog's arrival.

II. The authors applied the formol-gel and the antimony test of Chopra and Gupta to 280 dogs collected in the pound at Casablanca. 14·6 per cent. of the dogs gave positive results to the formol-gel test, opalescent gelification taking place within four hours and in the majority of cases in one hour. No positive results were obtained with the Chopra-Gupta test. A *post-mortem* examination was held on every dog reacting to the formol-gel test and the spleen and marrow of long bones were examined microscopically and culturally for leishmania. The result was negative in every case.

The authors conclude that the test is of no value for the diagnosis of the disease and that, if it occurs at all, canine leishmaniasis must be extremely rare in the neighbourhood of Casablanca.—A. Leslie Sheather.

Raffaele, G. (1931). Sul comportamento nel sangue dei parassiti della malaria aviaria. [**The Behaviour of the Parasites in the Blood in Avian Malaria.**] —*Riv. Malariol.* **10.** 281-310.

In the case of *Plasmodium praecox* the number of sporozoites inoculated does not invariably influence either the period of incubation or the course taken by the disease. In cases where the infection runs a severe course, the number of parasites present in the blood steadily rises until death takes place. In cases running a benign course, the number of parasites oscillates and clinical evidence of infection appears when the number is large. Eventually the number of parasites becomes steady. During the latent period there is a daily variation in the number. There would appear to be a kind of balance between the reproductive powers of the parasite and the defensive powers of the host.—A. Leslie Sheather.

Russell, P. F. (1931). **Anopheles Mosquitoes and Avian Malaria.**—*Amer. J. Trop. Med.* **11.** 145. [1 ref.]

Reference is made to the fact that Mayne (1928) reported the discovery of oocysts of avian malaria in anopheles mosquitoes. The author kept 13 different species of these mosquitoes in screened cages with canaries for four months and they were never observed to feed, although the same mosquitoes consumed avian blood freely when proffered in normal saline solution on mango juice. *Culex fatigans* and *Aedes aegypti* kept under similar conditions fed freely on the canaries. It is said that the results appear to refute the possibility that anopheles mosquitoes may be naturally infected with avian malaria.—R. S. Roberts.

I. Manalang, C. (1931). **Malaria Transmission in the Philippines. VI. The Dark Night Factor.**—*Philippine J. Sci.* **46.** 371-375. 3 tables.

II. Lyengar, M. (1931). **Absence of Malaria in the Salt-Water Lake Basin.** —*Ind. J. Med. Res.* **19.** 163-174. [8 refs.]

III. Vialatte, C., & Sainte-Marie, P. E. F. (1931). Autour du " Mystère " de la Fièvre quarte. [**The Mystery of Quartan Fever**].—*Bull. Soc. Path. exot.* **24.** 280–282. [2 refs.]

I. This paper records the variation in the catch of anopheles according to the darkness of the nights over a period of a year. One hundred and twenty-six

anopheles with positive glands were caught during the new moon periods against 72 during the full moon periods. Of these 72, 32 were caught on dark cloudy nights. It is said that malaria transmission is four times greater on dark nights than on bright nights.

II. This paper deals with an inland salt water basin in Bengal which was previously thought to be very malarious. A survey showed a spleen rate of only 0·3 per cent., indicating remarkable freedom. *Anopheles subpictus* formed 90 per cent. of the catch. As the population bordering the lake area is highly malarious and frequent contacts occur, the evidence points to the exclusion of *A. subpictus* as a carrier in nature.

III. This paper draws attention to the greater freedom from malaria of army units to the indigenous populations. The author ascribes this freedom to the prophylactic use of quinine which is most effective in the case of *Plasmodium malariae*.—U. F. Richardson.

Obitz, K. (1931). Ueber die Fütterungsinfektion wilder Ratten (*Mus decumanus* Pall.) mit Balantidium coli—Cysten von Schweine. [**The Infection of Wild Rats with the Cysts of *Balantidium coli* of Swine by Feeding**].—*Zschr. Parasitenk.* **3.** 649-653. [5 refs.]

Wild rats were caught and caged and the faeces examined for *Balantidium coli* at least eight times before they were put on experiment ; any that died before experiment were also examined but ciliates were never found. After the experiments, the animals were killed and at least 12 slides and two cultures were made from the intestinal contents. For culture, Dobell and Laidlaw's medium was used, having been inoculated with *Bact. alcaligenes* 24 hours before inoculation with *Balantidium coli* material. In this way a growth of ciliates was obtained by the next day.

The experiments showed that rats can be infected by feeding with the *Balantidium* cysts of pigs and 50 per cent. of the animals so fed showed active ciliates in the caeca. Rats fed with *Balantidium coli* cysts also excreted them in their faeces. It did not prove possible to infect other rats by feeding the faeces of rats which were excreting cysts.—U. F. Richardson.

Tsuchiya, H. (1931). **Studies on Diversity of Strains in *Giardia canis* (Hegner, 1922) and their Biological Variations as affected by Diet.**—*Amer. J. Hyg.* **14.** 577-599. 5 tables, 3 graphs. [28 refs.]

Two strains of *Giardia lamblia* have been described and the author set out to ascertain if distinct strains of *G. canis* existed and if they could be modified by changed environmental conditions. The conclusions are that two distinct strains of *G. canis* were encountered which varied from each other in the size of their cysts, the size of the trophozoites and the length of the parabasal bodies. A difference in the pathogenicity of the strain was not demonstrated. The characteristics of the types could be modified by changing the diet of the host from carbohydrate to protein, but they quickly reverted to normal when the change of diet was reversed.

The author notes that the trophozoites were more numerous when no cysts were present in the faeces, that this negative phase probably represents a period of increased multiplication and that it occurred whilst the experimental animals were on a carbohydrate diet.

It is noted that the experimental puppies exhibited diarrhoea stools during early infection and on autopsy showed thickening of the mucous membrane with petechial haemorrhages and superficial necrosis of the epithelium.

—U. F. Richardson.

THOMSON, J. G. (1931). **The Question of Immunity in Man to Protozoal Diseases.**—*Proc. Roy. Soc. Med. London.* **24.** 499-510. 1 chart. [58 refs.]

This paper is an excellent review of our present knowledge of immunity to protozoal diseases. The author discusses malaria of human beings and birds, trypanosomiasis, leishmaniasis and amoebiasis mainly in their relation to man. He discusses natural and acquired immunity, vaccination and serological reactions.

The conclusions are that there is definite evidence of absolute natural immunity, but that the commonest form is a partial immunity leading to tolerance which may break down. Acquired immunity is usually a form of tolerance maintained by repeated infections and it may be broken down if the reinfections are interrupted for any prolonged period. Little is known of the character of the natural or the acquired immune bodies, but there is some evidence that diet has an influence on them. In acquired immunity, antibodies are formed, but they are unstable and quickly eliminated. Acquired immunity thus depends largely on the persistence of the infection. Vaccines have not yet proved of much value and serological reactions are still in the experimental stage.—U. F. RICHARDSON.

DISEASES CAUSED BY FILTRABLE VIRUSES.

HAUDUROY, P. (1931). Les Ultravirus. [**Ultravisible Viruses**].—*2me. Congrès internat. Path. comp.* pp. 321-338.

This is a seventeen-page dissertation on ultravisible viruses. The article is divided into seven parts or chapters, the first of which consists of a brief summary. The author then attempts a definition and in subsequent chapters deals with the difference between viruses *per se* and filtrable forms of bacteria etc., concluding with a hypothesis on the origin of the former.—G. W. DUNKIN.

I. TORRES, C. M. (1931). Altérations non spécifiques de l'oxychromatine et du nucléoplasme et " inclusions intranucléaires " dans les maladies à virus. [**Non-Specific Alterations of the Oxychromatin and of the Nucleoplasm and Intranuclear Inclusions in Virus Diseases**].—*C. R. Soc. Biol. Paris.* **106.** 363-365. 3 figs. on 1 plate.

II. TORRES, C. M. (1931). Méronécrose dans les maladies à virus. [**" Meronecrosis " in Virus Diseases**].—*Ibid.* 367-368. [1 ref.]

I. The author points out the difficulties of distinguishing between the specific changes which occur in liver cells during yellow fever of man and certain non-specific alterations in which intranuclear acidophilic granules appear. Examination of 17 cases of yellow fever and 20 controls revealed that in only 3 of the yellow fever cases were the changes previously described in inoculated rhesus monkeys apparent. On the other hand intranuclear granulations similar in appearance to erythrocytes were found in 10 cases of yellow fever and in 6 controls. Acidophilic intranuclear granules were found in 10 cases of yellow fever and 5 controls. By means of illustrations of typical hepatic cells from subjects dead from yellow fever, the reader is assisted in distinguishing specific from non-specific changes.

II. A short note on " méronécrose " which appears to consist of a partial necrosis of cells. Different cells are affected in varying manner in different virus diseases. It is merely a hypothesis that the inclusion bodies present in such conditions are portions of the cells which have necrosed probably under the influence of a living virus.—R. LOVELL.

—. (1932). Informe del Profesor José Lignières sobre los experimentos realizados

con su vacuna antiaftosa en el Hospital del Lazareto dependiente del Ministerio de Agricultura, del 30 de Octubre al 17 de Diciembre de 1931. [**Report of Professor José Lignières upon Experiments carried out with his Foot and Mouth Disease Vaccine at the Ministry of Agriculture's Establishment, the Hospital del Lazareto, from the 30th October to the 17th December, 1931**].—*Rev. Zootéc.* **19.** 326-344.

An account of trials carried out with a secret remedy—said to be a vaccine against foot and mouth disease.—R. S. ROBERTS.

YAMAGIWA, S., & NIWA, M. (1932). **Studies on Contagious Pleuro-Pneumonia in Cattle. IX. On the Pathologic Anatomy of the Recovered Lesions of Lung Plague.**—*J. Jap. Soc. Vet. Sci.* **11.** 83-104. 14 figs. on 7 plates, 1 table. [5 refs.] [Orig. in Japanese : abst. from English Summary.]

The macroscopic and microscopic features of the varying lesions found in recovered cases of contagious bovine pleuro-pneumonia are described. The authors consider that in recovery the encapsulated material breaks down and is voided by the bronchi, while the deformed tissues left remain permanently in the lungs. Healed lesions are fairly characteristic but must be differentiated from those caused by chronic tuberculosis or dictyocaulus worm infestations.—NORMAN HOLE.

NAI, D., & PETRILLO, B. (1931). Sul transito silente del virus aftoso nella cavia. [**Occult Passage of the Virus of Foot and Mouth Disease in Guinea Pigs**].—*Biochim. e Terap. sper.* **18.** 428-444. 7 tables. [16 refs.]

When introduced into the stomach the virus of foot and mouth disease passed into the circulation of guinea pigs under certain conditions. This occurred in most young animals below 200 g. in weight, in 40 to 50 per cent. of animals up to two months old, but quite exceptionally in adults. The time necessary for the virus to appear in the circulation ranged up to 12 hours.

As a general rule oral administration produced neither obvious infection nor detectable immunity although in young animals repeated dosage at intervals of three to eight days sometimes produced fatal infection unaccompanied by the typical lesions on mouth or feet. Animals which survived repeated dosage showed no immunity and serum from them was not protective for other animals.

The method of deciding entry of the virus into the circulation was by plantar inoculation of blood and emulsion of mesenteric glands.—H. H. GREEN.

TORRES, S. (1931). A raiva no Brasil. Seu diagnostico pela fixação da alexina. [**Rabies in Brazil. Its Diagnosis by Fixation of Complement**].—*Rev. Zootéc. e Vet. Rio de Janeiro.* **17.** 148-157. [8 refs.] [Summary in French : abst. from orig.]

It is pointed out that in a country where rabies is prevalent, a rapid method of diagnosing the disease in the dog by a complement-fixation test is of the highest importance, as it is likely to yield an earlier result than the rabbit inoculation method and can be used in cases where the rabid animal has been killed in an early stage of the disease. (In the latter case nerve substance is tested against a known positive serum).

Reference is made to the work of REMLINGER who in January, 1931, expressed the view that diseases caused by other neurotropic viruses were being confounded with rabies and cast doubt in particular upon the soundness of diagnoses of rabies in Brazil. In the latter connection, it has been suggested that Aujeszky's disease may be mistaken for rabies.

The author obtained nerve substance from eight sources, including an out-

break in cattle where the disease had assumed atypical features, the most prominent of which was a cutaneous eruption [the latter is said to be characteristic of Aujeszky's disease], and sera from a natural case of rabies, artificially infected rabbits and rabbits infected with virus from the outbreak mentioned above. A detailed description of the preparation of the antigen for the complement-fixation test from nerve substance is given. When this was tested against sera from known infected animals and known negative sera and when the sera were tested against antigens made with nerve substance from healthy animals or from those known to be infected, well-defined results were obtained and the diagnosis of rabies was confirmed in all cases. The general conclusion is that there is no reason to suppose that other diseases have been mistaken for rabies in Brazil.—R. S. Roberts.

Remlinger, P., & Bailly, J. (1932). Contribution à l'étude du passage du virus rabique dans le lait. [**Contribution to the Study of the Passage of Rabies Virus in the Milk**].—*C. R. Soc. Biol. Paris.* **110.** 239-241. [1 ref.]

Remlinger, P., & Bailly, J. (1932). Sur la longue persistance du virus rabique dans l'encéphale de la Tortue d'eau douce (*Clemmys leprosa*). [**On the Long Survival of Rabies Virus in the Encephalon of the Fresh-Water Turtle** (*Clemmys leprosa*)].—*Ibid.* 421-423. [2 refs.]

The authors have not been able to examine the milk of natural cases as no rabid animal in lactation has passed through their hands for several years. Experiments performed with street virus on guinea pigs, cats and dogs gave only two positive results out of 43 tests.

Rabies virus, inoculated into the brain of the freshwater turtle, retains its activity and virulence apparently unchanged for more than 150 days, without causing any symptoms of illness.—Norman Hole.

I. Repetto, R. (1932). A propos de l'existence de la rage au Congo belge. [**Rabies in the Belgian Congo**].—*Ann. Soc. belge Méd. trop.* **12.** 147-151. [15 refs.]

II. Bablet, J., & Marneffe, H. (1932). Un cas de rage produit par un virus rabique des rues à virulence renforcée, observé à Hanoi. [**A Case of Rabies caused by a Street Virus of Abnormal Virulence seen at Hanoi**].—*Ann. Inst. Pasteur.* **48.** 301-307. [4 refs.]

I. Despite common opinion, the " mad dog " of West Africa is affected with rabies and vaccination of all human beings bitten by such animals is indicated. A number of cases of fatal rabies as the result of bites from such animals are quoted ; these cases had no opportunity to become infected with the European virus.

II. A European, bitten by a dog and given the routine antirabic treatment, died less than 20 days later. The virus involved was passaged into rabbits and had characters like those of a fixed virus, killing the animals in eight days or less. The authors suggest that institutes preparing antirabic vaccine should use a fixed virus of recent origin, preferably obtained from a street virus of high virulence such as described in this article.—Norman Hole.

Green, R. G., Zeigler, N. R., Dewey, E. T., & Shillinger, J. E. (1931). **Epizootic Fox Encephalitis. III. Experimental Transmission.**—*Amer. J. Hyg.* **14.** 353-373. 11 tables. [4 refs.]

In continuation of previous work [see this *Bulletin.* **2.** 290.] the authors describe experiments with nearly 200 foxes. The inoculation of infected brain and spinal cord by cisterna puncture or intramuscular injection caused a 70 per cent. mortality, as compared with a 20 per cent. mortality in natural infection.

Skin scarification, intraperitoneal, intratesticular and intranasal inoculations also gave positive results, but infection was not produced by corneal scarification. Virus was found in the blood and spleen, as well as in the nervous tissues ; the spleen content was high. The virus appeared to retain its original activity after being kept for five and a half months in 50 per cent. glycerol.

—Norman Hole.

I. Hirano, N. (1931). **Ultrafiltration and Dialysis of the Vaccinia Virus.** *Kitasato Arch. Exp. Med.* **8.** 189-194. 3 tables. [4 refs.]

II. Yaoi, H., & Kasai, H. (1931). **Effect of some Chemical Factors on the Survival of Purified Vaccine Virus.**—*Jap. J. Exp. Med.* **9.** 619-635. 21 tables. [3 refs.]

I. In the summary to his paper the author draws the following conclusions from the results of his experiments :—" (1) vaccinia virus in fresh testicular emulsions fails to pass through collodion membranes, but after the autolysis of the tissue fragments it is allowed to pass through the membranes which completely retain 1 per cent. haemoglobin ; (2) vaccinia virus passes through collodion membranes by dialysis even if a fresh testicular emulsion be used, and (3) from these above facts it can be inferred that the vaccinia virus is smaller than the molecule of 1 per cent. haemoglobin."

[The method of preparing the filter membranes employed by the author was remarkably crude and is not one which can be recommended for any accurate experiment. Elford and Andrewes —(1932). *Brit. J. Exp. Path.* **13.** 36.—using collodion membranes prepared by a refined method, have estimated that particles of vaccinia virus have a diameter of 0·125μ to 0·175μ (125 to 175$\mu\mu$). Bechhold and Schlesinger—(1931). *Biochem. Ztg.* **236.** 387.—from filtration data supplemented by centrifugal analysis estimate the virus to be slightly larger, 0·2μ (200$\mu\mu$) in size. The estimated size of an haemoglobin particle is 3 to 5$\mu\mu$].

II. The authors have studied the effect of various conditions and the action of 15 different chemicals upon the virus of vaccinia purified by the method previously communicated [Yaoi, H., & Kasai, H. (1929). *Jap. J. Exp. Med.* **1.** 243]. They summarize their results, but it is not possible to refer to them in detail in a short abstract. The authors promise a discussion of their results and those of previous workers in a later paper.—I. A. Galloway.

Dyer, R. E., Badger, L. F., & Rumreich, A. (1931). **Rocky Mountain Spotted Fever (Eastern Type). Transmission by the American Dog Tick** (*Dermacentor variablis*).—*Publ. Health. Rep. Washington.* **46.** 1403-1413. 1 table, 7 charts. [12 refs.]

It is known that the American dog tick (*Dermacentor variablis*) is capable of transmitting spotted fever virus. In view of the wide distribution of this tick in those parts of the United States where the eastern type of spotted fever occurs, the authors have attempted to transmit the disease through the agency of this vector.

A female tick was obtained from a spotted fever area and its larvae were fed on an infected guinea pig. After engorgement, the larvae were allowed to moult to nymphs which were fed on healthy guinea pigs, and were also ground up and injected into other guinea pigs. Characteristic febrile reactions were noted in these animals and from them a strain of the virus was obtained. The identity of the guinea pig virus with eastern and western types of spotted fever was established by the production of typical reactions in the rabbit and the monkey, and by cross-immunity tests.

It is concluded that the eastern type of Rocky Mountain fever is preserved in the body of *Dermacentor variablis* through at least one moult.—R. E. Glover.

Olitsky, P. K., Knutti, R. E., & Tyler, J. R. (1931). **Transmission and Cultivation Experiments with Human Trachoma and the Experimental Disease in Monkeys.**—*J. Exp. Med.* **54.** 31-40. 1 table. [7 refs.]

A characteristic conjunctivitis was produced in monkeys (*Macacus rhesus*) with trachomatous tissues removed from patients in New York. The transmission was successful in five out of eight cases by means of a single subconjunctival injection, and in each of two cases in which the patients' secretion was conveyed by swabs. *Bact. granulosis* was also recovered from six out of eleven subjects as well as from the infected monkeys.

The microscopical changes in the conjunctivae removed from the experimental animals resembled those described by Noguchi and by the authors in tissues inoculated with *Bact. granulosis*. They consisted of a folliculitis with scattered monocytic infiltration and a partial or complete denudation of the epithelial layer : in addition there was a certain degree of scar tissue formation.

In the monkey an experimental trachomatous conjunctivitis could be induced by repeatedly swabbing the conjunctiva with secretions from affected animals, or with cultures of *Bact. granulosis* : in the latter case, infection was facilitated by rubbing the eyelids. It was also shown that transmission could be secured by caging together uninoculated and inoculated animals.—R. E. Glover.

Wakeman, A. M., & Morrel, C. A. (1931). **Chemistry and Metabolism in Experimental Yellow Fever in Macacus rhesus Monkeys. III. Blood Sugar and Liver Glycogen.**—*Arch. Internal Med.* **47.** 104-115. 1 table, 2 charts. [16 refs.]

Since the liver suffers extensively in infection with the yellow fever virus, changes in the blood sugar and glycogen content of the liver would be expected as a result of the hepatic lesions. The experiments reported in this contribution were made to find out whether such was the case. It was found that hypoglycaemia was regularly present in monkeys with yellow fever as early as 24 hours before death and became progressively more pronounced as death approached. After hypoglycaemia had appeared, little glycogen was found in the livers of monkeys with yellow fever, and the hypoglycaemic action of epinephrine was greatly diminished or abolished. The changes in carbohydrate metabolism definitely preceded the disturbance of deaminization and urea formation reported in earlier papers of this series.

—Ll. E. W. Bevan.

I. Sellards, A. W. (1932). **Technical Precautions employed in maintaining the Virus of Yellow Fever in Monkeys and Mosquitoes.**—*Amer. J. Trop. Med.* **12.** 72-92. 5 figs. [4 refs.]

II. Frobisher, M. Jr., Davis, N. C., & Shannon, R. C. (1931). **On the Failure of Yellow Fever Virus to persist in a Colony of** *Aedes aegypti*.—*Amer. J. Hyg.* **14.** 142-146. 2 tables. [4 refs.]

III. Davis, N. C. (1932). **The Effect of Various Temperatures in Modifying the Extrinsic Incubation Period of the Yellow Fever Virus in** *Aedes aegypti*. —*Ibid.* **16.** 163-176. 5 tables, 1 chart. [22 refs.]

IV. Bauer, J. H. (1931). **Some Characteristics of Yellow Fever Virus.**—*Amer. J. Trop. Med.* **11.** 337-353. 4 tables. [11 refs.]

I. The technique employed in handling the virus of yellow fever is described. Some of the procedures might be adopted by veterinary workers studying the

transmission of animal virus diseases by insects.

II. The authors, as the result of the observations described in this paper, came to the conclusion that, in nature, yellow fever is not self-propagated among stegomyia mosquitoes and that these insects could not maintain infective quantities of yellow fever virus among themselves without some suitable intermediate host.

III. This work, which is explained in the title of the article, may prove of interest to veterinarians who are concerned with the comparative study of virus diseases.

IV. The author points out that, so far as is known, no infective agent has been discovered throughout the course of medical history which, when brought into the laboratory, has caused so high a rate of accidental infection among research workers as has the virus of yellow fever during the previous three years. All evidence seems to indicate that the incitant is exceedingly contagious while in the laboratory. His experiments showed that the virus of yellow fever occurs in the blood of experimentally infected rhesus monkeys in very high concentration ; of 18 specimens of blood taken from infected animals at the onset of fever and tested in dilution of 1 : 1,000,000, all proved infective ; and of six specimens tested in dilution of 1 : 1,000,000,000, three produced fatal infection in normal monkeys. A considerable variation in susceptibility was observed in these monkeys when a highly virulent strain of yellow fever virus was injected in very high dilutions, and very small amounts of the virus were frequently found to immunize animals without producing any outward signs of infection. In the majority of the animals inoculated with minute quantities of virus the infection was characterized by a rather long incubation period, followed usually by a sharp, short febrile attack and death.

The development of yellow fever antibodies in the blood of experimentally infected animals was found to take place early during the course of the disease. The serum taken at death from monkeys that died on the fourth, fifth and sixth days after inoculation showed no protective properties, but the serum of animals that died on the seventh day or later protected fully against massive doses of virus. The virus was found to possess a relatively high resistance to the action of *post-mortem* invading bacteria.—Ll. E. W. Bevan.

INVERTEBRATE VECTORS OF DISEASE.

Lewis, E. A. (1931). **Observations on Ticks and Tick-Borne Diseases.**—*Bull. Dept. Agric. Kenya.* No. 2. pp. 15. 6 figs., 1 table.

This is a general article which describes the rôle of ticks as vectors of east coast fever, redwater, anaplasmosis, *Theileria mutans* infection, spirochaetosis, heartwater, biliary fever, tick fever in dogs and Nairobi sheep disease. The author states that three soft ticks (argasids)—the fowl tick (*Argas persicus*), the tampan tick (*Ornithodorus savignyi*) and the eyeless tampan tick (*O. moubata*)—and 35 species of hard ticks (Ixodidae) are found in Kenya. He gives a brief account of their life history and groups them as one-host, two-host, three-host and many-host ticks. He mentions that in Kenya Walker has been unable to confirm the work of Jack in Rhodesia, who found that *Babesia bigemina* was passed through the egg of the common brown tick.—Norman Hole.

I. Bedford, G. A. H. (1931). **New Genera and Species of Mallophaga.**—*17th Rep. Direct. Vet. Serv. & Anim. Indust. Union of S. Africa.* pp. 283-297. 16 figs.

II. Bagnall, R. S. (1932). **On Mallophaga (Biting Lice) affecting the Mammals of Northumberland and Durham.**—*Vasculum.* **18.** 14-18.

I. The author describes *Tricholipeurus antidorcus* n.sp. from specimens taken off *Antidorcas marsupialis* (springbok); *Otidoecus dimorphus* n. gen. et sp. [family Philopteridae Burmeister] is described from specimens of *Choriotis kori* (giant bustard); *Otilipeurus kori* n. gen. et sp. [family Philopteridae] is described from a female and male taken from *Choriotis kori.*

The new genus *Falcolipeurus* is established to include the following species :—*Ethiopterum aetheronomum* Nitzsch, *E. monile* Nitzsch, *E. oviceps* Piaget, *E. perspicillatum* Nitzsch, *E. quadriguttatum* Giebel, E. *quadrioculatum* syn., *E. elongatum* Piaget, *E. quadripustulatum* Nitzsch, *E. sulcifrons* Denny, *E. turnatum* Burmeister and *E. secretarium* Giebel.

Falcolipeurus africanus n. sp. is described from material from *Pseudogyps africanus fullebornei* (southern white-backed vulture); *F. lineatus* n. sp. is described from specimens from *Gyps coprotheres* (Cape vulture).

II. After discussing the classification and host distribution of biting lice, the author gives a list of the species taken by himself and others from mammals in Northumberland and Durham. The species recorded are :—*Trichodectes equi* L. and *T. pilosus* Greb. from horses; *T. bovis* L. from cattle; *T. tibialis* Piaget from fallow deer and *T. longicornis* N. from red deer; *T. subrostratus* Nitzsch from cats; *T. canis* de Geer from dogs; *T. vulpis* Denny from foxes; *T. exilis* Nitzsch from otters; *T. melis* Fabr. from badgers; *T. mustelae* Schr. from stoats, and *Gyropus ovalis* N. and *Micropus porcelli* Linn from guinea pigs.—J. S. Steward.

Tubangui, M. A. (1932). **Observations on the Possible Transmission of Surra by the Land Leech** *Haemadipsa zeylanica.*—*Philippine J. Sci.* **48.** 115-126. 2 figs. on 1 plate, 5 tables. [9 refs.]

Suggestions have been put forward from time to time in the literature on this subject that leeches may play some part in the transmission of surra, but the question has not been subjected to thorough investigation. In this paper the author records experiments with the water leech, *Hirudinaria manillensis* and the land leech, *Haemadipsa zeylanica* as possible transmitting agents of *Trypanosoma evansi.* Summarizing these, it was found that the trypanosome was unable to live in the former for more than about one and a half hours, while in the latter positive results were obtained in some cases up to four hours. No evidence was obtained that the parasite can undergo any cycle of development in the leech, but it was found to be a possibility that land leeches could transmit the infecton mechanically and under experimental conditions, provided that the interval between feeds was sufficiently short. The leeches probably play a part in the transmission of the disease in ordinary circumstances.—A. Leslie Sheather.

Huff, C. G. (1931). **The Inheritance of Natural Immunity to** *Plasmodium cathemerium* **in Two Species of** *Culex.*—*J. Prevent. Med.* **5.** 249-259. 2 figs., 1 table. [6 refs.]

The author has previously shown [(1929). *Ann. Trop. Med. & Parasitol.* **23.** 427.] that the natural susceptibility of individual *Culex pipiens* to infection with *Plasmodium cathemerium* was largely determined by heredity. By selecting the progeny of infected and of uninfected females, he found that in the former case the percentage of infected individuals increased rapidly, whereas in the latter case there was a marked decrease.

In the present investigation, these observations were confirmed and extended to *Culex quinquefasciatus.* The mosquitoes were fed on birds infected with *Plas-*

modium cathemerium, allowed to oviposit in separate cages and the eggs collected. The degree of infection in the mosquitoes was then determined by a count of the number of oocysts found on the stomachs. The progeny from each batch were then fed on infected birds.

In the experiments with *C. quinquefasciatus* which were carried to the third generation, it was noted that, after the second generation, the indices of infection were respectively 59 per cent. for the progeny of infected mosquitoes and 16·7 per cent. for those from uninfected mosquitoes. In the case of *C. pipiens*, the experiments were discontinued after five generations of selection. Over the whole series, it was found that of 243 individuals from infected mothers, 132 (54·3 per cent.) were infected, whereas of 273 from uninfected mosquitoes, 58 (21·2 per cent.) only were infected.

An examination of a table showing the relationship of the different families suggested that the susceptibility of *C. pipiens* to the parasite behaved as a simple recessive Mendelian character.—R. E. Glover.

DISEASES CAUSED BY METAZOAN PARASITES.

I. Steward, J. S. (1931). **A List of Parasites Examined during the Year.**—*2nd Rep. Direct. Inst. Anim. Path. Univ. Cambridge*. pp. 200-203. 1 table.

II. Pillers, A. W. N. (1932). **Notes on Parasites in 1931.**—*Vet. Rec.* **12.** 898-899. 1 table.

I. This is similar in form to Pillers' annual list. Eighty-one records are made of parasites taken from domestic and other animals in this country. The more interesting items include *Andrya cuniculi* from wild rabbits, *Skrjabinia columbae* from wood pigeons, *Eucoleus aerophilus* from the lungs of a silver fox, *Uncinaria stenocephala* in a wild fox, *Ostertagia asymmetrica*, *Cooperia oncophora*, *Oesophagostomum venulosum*, *Capillaria* sp. and *Nematodirus* sp. from fallow deer, *Oesophagostomum dentatum* considered responsible for deaths in swine, *Argas vespertilionis* from the common bat, and *Dermanyssus avium* in large numbers causing deaths in young chicks. A number of parasites are also recorded from freshwater and marine fish.

II. This is the author's annual report on parasites he examined during the previous year. Among the more interesting of the 53 records are *Dibothriocephalus latus* in a Canadian bear, *Amoebotaenia sphenoides* causing deaths in poultry, *Ascaris lumbricoides* from a calf, *Toxascaris leonina* from a tiger, *Onchocerca cervicalis* from two cases of poll-evil and fistulous withers in horses and *Thelazia californiensis* from the conjunctiva of a dog in California; *Graphidium strigosum* is reported as causing serious losses in rabbits; *Linguatula serrata* was obtained twice from the nasal cavities of dogs, *Rhinoestrus purpureus* from the throat of a horse in Gibraltar and *Hypoderma bovis* from the subcutis of a horse.

—J. S. Steward.

I. Seddon, H. R. (1931). **Conditions which Predispose Sheep to Blowfly Attack.**—*Agric. Gaz. New South Wales*. **42.** 581-594. 6 figs.

II. Seddon, H. R., Belschner, H. G., & Mulhearn, C. R. (1931). **Studies on Cutaneous Myiasis of Sheep. (Sheep Blowfly Attack).**—*Dept. Agric. New South Wales, Sci. Bull.* No. 37. pp. 42. 16 tables.

I. In a Science Bulletin issued by the Department of Agriculture, New South Wales, the writer and others have recorded the results of certain observations made on this problem during the previous four years. The purpose of the present

article is to express these results in simpler form and to add more recent observations. It was sought to ascertain whether the condition of the sheep played an important part in rendering it liable to attack. A distinction is drawn between what have been classed as normal and abnormal attacks ; the former including the striking of ewes around crutch and tail and the wethers around the prepuce ; the latter including strike following " water rot " of wool in ewes and wethers, strike around vulva and crutch in ewes affected with inflammation of the uterus following parturition, strike in lambs after docking or in wethers following marking, and strike associated with discharging wounds such as operation wounds, sheer cuts, " cancers " of the ear, grass-seed infestations below the eye, " scabby mouth " on the muzzles of lambs and gangrene of the udder of ewes.

It was found that animal matter, whether it be wool, skin scales, yolk, sweat, blood, pus, or muscle, when moisture is present, is invaded by bacteria and as the result of decomposition becomes attractive to the fly. Therefore measures for prevention and cure must be based upon the prevention of bacterial decomposition. Investigations are being undertaken to ascertain the best type of dip to use to kill wool-discolouration bacteria.

II. This bulletin is divided into three parts. The first deals with observations on the susceptibility of sheep to blowfly attack ; the second discusses the influence of breeding as a factor in the sheep blowfly problem, and the third describes various dressings for fly-struck sheep.

From careful observations and experiments it appeared very definite that susceptibility to fly attack was determined by conformation of the breech, which in the great majority of cases concerned the degree of wrinkling and was therefore a factor inherent in the animal. Also it was found that the frequency with which sheep were struck was in accordance with their susceptibility and that in successive seasons the same sheep form the most susceptible group. It seems reasonable to conclude that susceptibility of sheep to blowfly attack is a definite factor present (and chiefly inherent) in the sheep.

The opinion is expressed that in dealing with fly and fly-struck sheep, no one method alone can be anticipated to cope with the problem. Crutching of sheep, trapping of flies, poisoning or destroying of carcasses, dressing of fly-struck sheep and the destruction of maggots are all measures which, when properly carried out, " do exert a considerable degree of success." To these should be added selective breeding and culling with a view to reducing the susceptibility of the sheep itself.

—Ll. E. W. Bevan.

I. Dinulescu, G. (1930). Sur la présence en France du Gastrophilus inermis. [**The Presence of *Gastrophilus inermis* in France**].—*C. R. Acad. Sci. Paris.* **190.** 319-320. [5 refs.]

II. Dinulescu, G. (1931). Une larve d'oestride produisant des tumeurs dans le duodénum des Chevaux en Espagne. [**An Oestrus Larva producing Tumours in the Duodenum in Horses in Spain**].—*Ibid.* **193.** 550-552. 5 figs. [1 ref.]

III. Wright, W. H. (1932). **Treatment of Horse Bots, *Gastrophilus* spp.**—*Vet. Med.* **27.** 4-6. [10 refs.]

I. The author followed the development of the third larval stage of *G. inermis* in the rectum of horses killed in a slaughterhouse. Combining his own observations with those of earlier workers, he concludes that the larvae are hatched from eggs deposited on the face, and that from here they burrow as far as the mucous membrane of the mouth, where they pass the earlier part of the first larval stage. They then pass to the mucous membrane of the rectum, where they

pass the second and third stages. When expelled they burrow into the ground and there continue the nymphal stage, from which the adult evolves. The development of the larvae on the cheeks corresponds with the time of year when mycosis of the cheeks is common in horses.

II. A Gastrophilus larva encountered in Spanish horses imported into France is described. The larva is peculiar in that, in the second larval stage, it burrows under the mucous membrane of the duodenum, giving rise to tumours varying from the size of a filbert nut to that of a hen's egg. The third stage is passed on the surface of the mucous membrane with the head and the first two segments buried in the mucous membrane. The spines and stigmata are rudimentary in the second stage. It is pointed out that a similar parasite has been described under the name of *Oestrus meridionalis* Pillers and Evans, 1926, as occurring in zebras in Rhodesia.

III. A review article dealing with the anthelmintics used in the treatment of horse bots. It is stated that, although it sets up a mild gastritis, carbon disulphide is the only drug known to be 100 per cent. effective.—R. S. Roberts.

Burghoffer, G., & Lörincz, F. (1931). Az echinococcus gyakorisaga Magyarországon. 1. Az Echinococcus granulosus gyakoriságára vonatkozó vizsgálatok budapesti kóbor kutyákban. 2. Echinococcustömlok gyakorisága vágónhidi állatokban. [**The Frequency of *Echinococcus* in Hungary. 1. Researches on the Incidence of *Echinococcus granulosus* in Vagrant Dogs of Budapest. 2. Frequency of Hydatids in Slaughtered Animals**].—*Allatorv. Lapok.* **54.** 313-318 and 332-333. 2 tables. [27 refs.]

The authors conducted large scale comparative examinations to ascertain the percentage of hydatid disease occurring in slaughtered animals (sheep, cattle, swine and horses) and to correlate the results with the incidence of *Echinococcus granulosus* in Hungarian dogs. " Whilst the incidence of hydatids in relation to animals (except sheep) of the whole of Hungary was studied, it was only possible to inquire into the incidence of the adult stage (*Echinococcus granulosus*) in dogs of Budapest."

Out of a total of 104 dogs examined, three (2·8 per cent.) harboured adult *Echinococcus granulosus*. This percentage appears fairly high if compared with the number of officially registered (21,000) and stray (between eight and nine thousand) dogs living in Budapest.

Out of a total of 10,325 sheep examined, 193 (1·8 per cent.) were found affected with hydatids. The incidence, however, varied greatly in the flocks slaughtered on various dates. While certain flocks were free from hydatids, in others, coming from localities in which there was apparently more infection, cysts were present in from 3·4 to 16·2 per cent. The cysts occurred in 7·1 per cent. of cattle, in 17·3 per cent. of swine and in 2·1 per cent. of horses. Most of the animals harboured more than one cyst. It is of interest to note that, in the majority of cases in sheep (54 per cent.), the multilocular type of cyst was observed, some of them being fertile.

In conclusion the authors emphasize the sanitary measures to be followed in order to reduce the general incidence of echinococcosis in dogs which are actually the most important carriers of the infection.—A. Kotlán (Budapest).

Richters. (1931). Die Bekämpfung der Wurmkrankheiten des Pferdes, insbesondere der Sklerostomiasis, vom Standpunkt der Hygiene und Therapie. [**The Control of Worm Diseases in Horses, particularly Sclerostomiasis, by Hygienic and Therapeutic Measures**].—*Deuts. tierärztl. Wschr.* **39.** 260-264.

This paper deals in a general way with sclerostomiasis and its control. The author thinks that the number of eggs in the faeces is not of much value for diagnosis and prefers to be guided by the clinical condition of the horse. Referring to the vitality of the infective larvae, he notes that he has observed them to remain alive in the open for as long as 24 months, being exposed during that time to considerable heat and dryness in the summer and to temperatures as low as –25° C. in winter. He appears to be of the opinion that there is considerable danger of infection being acquired in the stable and advises the use of milk of lime (" Kalkmilch ") on the walls and mixed with the soiled litter. He also advises that milk of lime be used on the droppings in the field and sprinkled on the surrounding ground. [Precisely what is intended by " Kalkmilch " is not very clear but it is presumably the mixture of slaked lime and water usually called " lime-wash."]

Tartar emetic is considered to be the best anthelmintic given both intravenously (1 g. well diluted) and by the mouth (4 to 5 g. well diluted), the doses being repeated twice at intervals of eight days. Another preparation of antimony, antimosan, also gave good results. [According to a report in a later number of this journal (pp. 774-775) the same paper was given, along with a few notes on the control of strangles in horses, before a meeting of the Veterinary Society of Neumark and Grenzmark. A report of the paper also appeared in the *Berl. tierärztl. Wschr.* **48.** 31].—E. L. Taylor.

IMMUNITY.

Friedberger, E., & Gurwitz, I. (1931). Vergleichende Versuche über das antikörperbildende Vermögen von älteren und jungeren Antigenen ; nebst einem Anhang : " Ueber Alters-Isoantikörper." **[Comparative Experiments on the Antibody-Building Powers of Old and Young Antigens ; together with a Supplement : " On Isoantibodies of Old Age "].**—*Zschr. Immun.-Forsch.* **71.** 453-458. 4 tables. [5 refs.]

In the absence of experimental evidence it has often been suggested, or assumed *a priori*, that young cultures are of greater antigenic value than older ones. The authors have therefore put this question to the test in the case of typhoid bacteria, and have also compared fresh and stored red cells.

Ten rabbits were injected with fresh red cells and eleven with cells which had been stored for four or five weeks in the cold. Seven rabbits were injected with killed typhoid bacteria from a 24-hour culture and seven with killed bacteria from a 30-day culture. The rabbits were adult and the dose was varied according to the body weight. Differences were observed in the response, but there was no evidence that fresh or young antigens were preferable to older ones. No support was found for the view of A. Langer that young tubercle bacilli are of greater immunizing value than older ones. The authors also report that, in contrast to Picado and Weinberg, they have never been able to produce iso-precipitins in young rabbits by injection of citrated blood from older rabbits.

—A. W. Stableforth.

Mackie, T. J., & Finkelstein, M. H. (1932). **The Bactericidins of Normal Serum : their Characters, Occurrence in Various Animals and the Susceptibility of Different Bacteria to their Action.**—*J. Hyg. Cambridge.* **32.** 1-24. 11 tables. [31 refs.]

This is a continuation of the work described in a previous article by the

same authors [see this *Bulletin*. **1.** 244]. Two types of natural bactericidin have been demonstrated. One is thermolabile, gives a specific antibody-complement reaction, is inactivated at 55° C., and destroyed at 60° to 65° C. The other is more thermostable : it appears to be a single homogenous agent (unlike the thermolabile specific body, which is highly differentiated), is active at 55° C., destroyed between 57·5° and 60° C., and gives a reaction in which complement apparently plays no part.

These two bacteriolytic components proved remarkable in that the thermolabile body acted only on Gram-negative organisms, and the thermostable body only on Gram-positive ones. Absorption tests showed the two reactions to be entirely independent of each other ; and PETTERSONN'S claim that the thermostable body has a dual constitution could not be confirmed and experiments with the " lysozyme " of FLEMING and ALLISON indicated that this is distinct from the thermostable bactericidin. This latter body apparently corresponds to the old " anthracidin." The two types of bactericidin appear almost simultaneously in the sera of young animals.

A number of different animal sera were studied. In general, bactericidal effects were more frequently found against the Gram-negative organisms. The most reactive Gram-negative strains belonged to the vibrios and typhoid-paratyphoid-dysentery group. The sheep and ox gave the best thermolabile bactericidal serum, human, horse, white rat, pig, and rabbit sera being intermediate, and guinea pig and pigeon sera being the least active.

Of the Gram-positive organisms studied, attenuated anthrax bacilli, avirulent pneumococci, and *Micrococcus lysodeikticus* proved the most reactive ; the rabbit and white rat gave the best sera, the guinea pig and pigeon the worst, and the serum of man and of the other animals occupied an intermediate position.

—NORMAN HOLE.

I. DARLING, F. (1931). **Natural Immunity and Disease Resistance. The Genetical Point of View.**—*Quart. Bull. Imp. Bureau Anim. Genet.* **2.** 73-84. [12 refs.]

II. VOGE, C. I. B. (1931). **Is there a Correlation between Metabolic Efficiency and Natural Immunity ?**—*Ibid.* 86-90. [2 refs.]

I. The first paper is a review of our limited knowledge regarding the heredity of natural immunity and disease resistance. Immunity to a disease is stated to be that condition exhibited by an animal, whereby under no natural conditions of environment can the animal contract the disease, no matter how close to infection it may come. Examples such as the inability of human beings or horses to contract rinderpest are given. It is pointed out that for practical purposes " racial resistance " to disease is a better term ; an example of this is the susceptibility of the negro to tuberculosis as compared with the white man. [It is evidently considered that " immunity " is absolute and not a relative condition whilst the relative condition which may depend on many factors irrespective of the state of the animal, such as dosage, continued exposure to infection, etc., is spoken of as " resistance "].

Two main observations stand out, first that the quality of the food supply and the power to metabolize food are associated with a capacity to resist disease and secondly the question of the association of pigmentation and resistance. Four main points in the difficulties involved in the breeding of highly resistant stocks of animals are mentioned :—(1) that the capacity to resist certain diseases may be possessed by stock which is economically inferior in quality and therefore not worth breeding from ; (2) the probability that resistance or susceptibility is dependent

upon multiple factors ; (3) the variation in virulence or antigenic structure and the possibility of further mutation of causal organisms or viruses and (4) the apparently interminable business involved in breeding an animal resistant to so many varied diseases.

II. The second paper gives a resumé of antigens, antibodies and their *in vitro* reactions and it is argued that increased metabolic activity and nuclear synthesis may develop in the animal an increased resistance to disease which would appear to be of a non-specific nature.—R. Lovell.

Toshima, K. (1931). **A Cold Haemotoxin newly discovered in the Heated Serum. II. The Cold Non-complementary Haemolysis by the Heated Normal Serum. III. Experiments on its Chemical Nature and on the Influence of Substances inhibiting Other Sorts of Haemolysis. IV. The Cold, Non-complementary Haemolysis caused by the Heated Serum of Cold-Blooded Animals. V. The Cold, Non-complementary Haemolysis by the Heated Body Fluids.**—*J. Biochem. Tokyo.* **13.** 441-464 and 489-511. **14.** 1-7 and 9-23. 42 tables. [74 refs.]

II. The non-complementary haemolysis present in heated serum which was described in the first article of this series is strongest in rabbit serum, weaker in chicken and pig serum and weakest in that of man, goose, cattle, etc., but varies greatly in different individuals. Sera heated at 90° C. have the greatest activity. Haemolysis occurs only below 5° C. and usually at 0° C. It has no connection with haemolytic amboceptor. It occurs in isotonic solutions of potassium chloride, nitrate and bromide, but not in sulphates or saccharose. The agent responsible is present in the albumen fraction but not the globulin and will not pass a Chamberland filter. It is not affected by mixing with an equal volume of N/10 hydrochloric acid or sodium hydroxide and leaving at room temperature for 20 hours. If the serum is previously heated, but not otherwise, it is markedly weakened by ultra-violet light, drying, and by ether or chloroform.

III. The substance causing cold-haemolysis cannot be extracted by lipoid solvents or salted out with ammonium sulphate, but is removed with the serum protein by various methods. It is probably of albumen character. It does not dialyse ; it is absorbed by kaolin, both in the inactive state in unheated serum and in the activated state in heated serum, but by erythrocytes only when in the active state. The haemolysis is inhibited by the fresh serum of various animals, by serum albumen, cholesterin, egg yolk, peptone, casein and trypsin, but not by serum globulin, licithin, egg albumen, pepsin, bile or bile salts.

IV. Of sera from cold-blooded animals tested (eel, carp, turtle, frog) only that of the frog contained the cold-haemotoxin ; its action was only apparent on erythrocytes of certain animals.

V. The cold-haemotoxin was not found in human milk, nor in the urine of man or rabbit. It was detected in saliva and in peritoneal exudate and transudate from man and in the saliva, aqueous humour, cerebrospinal fluid, pleural, peritoneal and pericardial exudates of the rabbit.—A. W. Stableforth.

Smith, Theobald. (1931). **The Agglutinating Action of Agar on Bacteria.**—*Science.* **74.** 21. [1 ref.]

The author describes briefly a phenomenon of the clumping of bacteria, presumably by some factor inherent in agar. When growth from an agar surface is suspended in water, saline or broth, *Br. abortus* exhibits Brownian movement. When that same growth is suspended in a small drop of condensation water from the same or another agar slope, then clumping occurs readily. Acid agglutination

is eliminated, so apparently is the effect of any agglutinins present in any animal tissue used in the preparation of the media. If the original condensation water be removed and replaced by broth, saline or water, then in a few days that will have acquired the property. A second replacement acts similarly. The clumping agent is present in the water in which agar shreds are allowed to swell up. Clumping has also been observed with staphylococci, streptococci, *Bact. pullorum* and *Br. bronchiseptica*.—R. Lovell.

Gay, F. P., & Holden, M. (1931). **Loss of Viricidal Property in Serums from Patients with Herpes and Encephalitis.**—*J. Amer. Med. Ass.* **96.** 2028-2029. 1 table. [8 refs.]

The authors have studied the neutralizing properties of various human sera on the virus of herpes. The neutralizing power of each serum was tested by mixing it with equal parts of the supernatant fluid from a 20 per cent. centrifugalized virus emulsion. The mixtures were kept at 37° C. for 1½ hours and 0·4 c.c. were inoculated either into the foramen magnum or intradermally when a good dermotropic strain was available. [It is presumed that the rabbit was the test animal although it is not stated]. In many instances both methods of testing were employed and the results compared favourably. The patients whose sera were examined may be divided into four groups, viz., Group I, 40 patients sent in for Wassermann tests ; no cases of herpes or epidemic encephalitis were included in this group : Group II, 16 patients with primary or recurrent herpes simplex ; the sera were collected during the acute phase : Group III, 42 cases of "chronic encephalitis syndrome" : Group IV, 13 cases of acute epidemic encephalitis. The results of the virus neutralization tests are given in a table. The sera which showed neutralizing properties were :—of Group I, 35 (88 per cent.) ; of Group II, 4 out of 9 sera, (44 per cent.) of cases of primary acute herpes and 5 out of 7 (70 per cent.) of cases of recurrent acute herpes ; of Group III, 23 (54 per cent.) and of Group IV, 2 (15 per cent.)

The authors maintain that their results indicate that the usual neutralizing action of normal serum on herpes virus is slightly reduced on the average in herpes that is recurrent and distinctly reduced during a primary attack of the disease. They further claim that the sera from acute cases of epidemic encephalitis, although limited in number, show in a large percentage of instances, loss of their power to neutralize herpes virus and that the loss occurs less frequently in chronic cases of the disease, although they are still in marked contrast with control cases.

They suggest that their results indicate a relationship between epidemic encephalitis and herpes simplex. [It would be interesting to know definitely that comparable results would be obtained if a larger number of sera from the different groups were examined. One would also like to see included in the series two other groups, one being a group of patients with any acute eruptive fever, other than herpes, or indeed any acute infection, and the other, patients with acute brain infections other than encephalitis lethargica—see also Andrewes, C. H., & Carmichael, E. A. (1930). *Lancet.* **218.** 857 ; Zinsser, H., & Tang, F. F. (1929). *J. Immunol.* **17.** 343, and Brain, R. T. (1932). *Brit. J. Exp. Path.* **13.** 166].—I. A. Galloway.

Neter, E. (1931). Ueber den Einfluss verminderten Kochsalzgehaltes auf die Komplementbindungs-reaktionen. [**On the Influence of Decreased Sodium Chloride Content on the Complement-Fixation Reaction**].—*Zschr. Immun.-Forsch.* **72.** 136-154. 10 tables. [5 refs.]

It was found that a decrease of the amount of salt present during the first

phase of the reaction from 0·9 to 0·6 per cent. resulted in an increased fixation of complement. This was first observed with alcoholic heterogenetic and non-heterogenetic organ extracts and with lecithin and their respective antisera. The anticomplementary action of the antigens themselves was also intensified. Increased fixation was also noted in the case of sera prepared with blood serum albumen or coliform organisms. This increase was not due to a weakening of complement in media of low salt content, but to a condition favourable to fixation.

It is suggested that the findings should be used to make the complement-fixation reaction more sensitive, 0·6 per cent. saline being used for the first phase and 1·8 per cent. saline for the dilution of the haemolytic antibody used in the second phase of the reaction.—A. W. Stableforth.

I. Frobisher, M., Jr. (1931). **An Improved Antigen for the Complement-Fixation Test in Yellow Fever.**—*Amer. J. Hyg.* **14.** 147-148. [5 refs.]

II. Hudson, N. P. (1932). **Dried Infectious Monkey Serum as Antigen in Yellow Fever Complement Fixation.**—*Ibid.* **15.** 557-565. 2 tables. [7 refs.]

I. The sera of persons or monkeys actively immunized to yellow fever will react to " fix " complement when mixed with saline extracts of livers taken at autopsy from monkeys which have died of yellow fever. A procedure is described for which it is claimed that the supply of antigen will last a long time and can be carried conveniently to places where fresh livers of monkeys which had died of yellow fever are not available. Also, as the material has been stored for months at room temperature, it is no longer infective and may safely be used by anyone.

II. The results of experiments on the complement-fixation reaction in yellow fever are recorded. Antigenic preparations which were found to be most effective in binding complement in the presence of immune serum were specimens of pooled monkey serum taken during the febrile period of acute attacks of yellow fever. Their antigenic property was conveniently maintained for more than a year by drying them while frozen and storing them in the dry state.

—Ll. E. W. Bevan.

Landsteiner, K., & van der Scheer, J. (1931). Beobachtungen über Präzipitinreaktionen mit Azoalbumosen. [**Observations on Precipitin Reactions with Azoalbumoses**].—*Zschr. Hyg. u. Infektkr.* **113.** 1-8. 4 tables. [5 refs.]

Sera produced in rabbits by injection of azoalbumoses gave precipitates with azoheter and azoprotoalbumoses, but did not distinguish between these preparations. A specific distinction was observed between the azoalbumoses from diverse proteins (horse, ox, chicken, etc.) The authors note that the preparations used in most of the experiments were not very pure but, as a result of control experiments with purified albumoses and with meta-protein and plastein, they believe that the reactions were actually due to albumoses and not to admixture with meta-protein or plastein.—A. W. Stableforth.

Medveczky, A., & Uhrovits, A. (1931). Immunitätsforschungen mit benzoylierten Antigenen. [**Immunity Experiments with Benzoylated Antigens**].—*Zschr. Immun.-Forsch.* **72.** 256-281. 14 tables, 2 charts. [29 refs.]

By the injection of rabbits with benzoylated horse or ox serum, antisera were produced which gave precipitates with benzoylated horse, ox or swine serum and with benzoylated egg albumen and also to a much higher titre with the non-antigenic benzoylated gelatin. The antisera reacted with various compounds of these proteins, with substituted acids e.g. sulphonic acids, and also with aliphatic acids. They did not react, however, with the various native sera or with egg albumen. On the

other hand, antisera produced with native sera reacted with the various benzoylated compounds, a circumstance which is believed to show that in the course of the combination the structure of the proteins is not radically altered. The precipitation reactions were confirmed by fixation of complement. Parallel results were also obtained by tests of anaphylactic activity on guinea pigs ; these, moreover, were more sensitive to benzoylated gelatin than to the other compounds. Sodium benzoate neither inhibited the precipitation reactions nor acted as a desensitizer in anaphylaxis experiments. In both precipitation and anaphylaxis tests the activity of the benzoylated protein increased with increased benzoylation up to a certain point and then decreased.

Benzoylated typhoid bacteria produced a much stronger response than benzoylated serum proteins : sera thus produced precipitated benzoylated gelatin even in a dilution of 1 : 10,000,000 and caused the death of a sensitized guinea pig in a dose of 0·000015 g. In experiments with gelatin benzoylated to 2, 5 and 20 per cent. respectively it was found that intensity of precipitation and anaphylaxis ran quantitatively parallel and that equal amounts of salt-binding groups produced equal effects. It is concluded that in both cases the activity is connected with the amount of the salt-binding groups and referable to a colloidochemical reaction.

—A. W. Stableforth.

Shera, G. (1931). **Exotoxins in Relation to Vaccine Therapy.**—*Brit. Med. J.* Sept. 12th. 497. [2 refs.]

The author believes that in the preparation of staphylococcal or streptococcal vaccines due account should be taken of the fact that these organisms possess diffusible exotoxins as well as endotoxins, and that the rational method is to prepare the vaccine from growths in liquid media and to include a certain proportion of that medium in the vaccine. The author suggests that the deposit from 24 to 48-hour glucose serum-broth cultures should be suspended in saline containing 5 per cent. of the supernatant fluid from the culture.—A. W. Stableforth.

I. Hosoya, S., Takada, M., & Terao, S. (1931). **On the Immunological Value of Anatoxin derived from Purified Tetanus Toxin.**—*Jap. J. Exp. Med.* **9.** 33-38. 3 tables. [11 refs.]

II. Kaktine, A. (1931). L'immunisation active des Cobayes contre le tétanos. [**Active Immunization of Guinea Pigs against Tetanus**].—*C. R. Soc. Biol. Paris.* **108.** 738-739.

I. Purified tetanus toxin was produced by treatment of a 10-day culture filtrate in the following manner. One litre of the sterile filtrate was precipitated with a 2 per cent. aqueous solution of zinc chloride. The precipitate containing the active principle was washed in distilled water, triturated in a mortar and dissolved with ammonium citrate solution, and the zinc was then precipitated out as zinc sulphide by the addition of ammonium sulphide. The toxin was present in the filtrate and was shown by experiment to have an M.L.D. for mice of about 0·00005 c.c. To the purified toxin was added formalin 0·4 per cent. and the mixture was left at 37° C. for 24 hours, after which it was faintly acid., A neutralized solution was shown to be non-lethal for mice and was able to protect guinea pigs against toxin and cultures of *Cl. tetani.* Two horses were immunized by the anatoxin and antitoxin appeared in the serum.

II. The author has mixed diluted tetanus toxin with lanoline and vaseline and endeavoured to immunize guinea pigs by rubbing this mixture into the skin. One difficulty is to find the M.L.D. and this depends upon the concentration present in the mixture rather more than upon the amount used for immunization. Although

local symptoms were apparent after treatment, there was no immunity to a subsequent injection of tetanus toxin.—R. LOVELL.

POPE, C. G., & SMITH, Margaret L. (1932). **The Routine Preparation of Diphtheria Toxin of High Value.**—*J. Path. & Bact.* **35.** 573-588. 3 tables, 2 charts. [24 refs.]

The authors describe the modifications of media preparation which they have found most effective in enhancing the value of diphtheria toxin. They recommend a tryptic digest of horse muscle, in which digestion takes place at 50° C., the trypsin emulsion being added at half-hourly intervals for six hours ; the temperature prevents bacterial contamination and the periodic addition of trypsin enables more complete digestion. They emphasize the value of sodium acetate and maltose in the medium and point out the importance of the ratio of surface area to volume in the culture flasks. The latter factor has an influence on the pH variation, which, after growth has commenced, should never fall to below 7·2 and should revert to over 8·0 after ten days, the optimum period of toxin production. The strain of *Corynebacterium diphtheriae* should be of good toxigenicity and acclimatized to the medium ; 30° C. was found to be the optimum temperature for toxin production.—NORMAN HOLE.

HOFFMAN, F. (1931). Immunossági vizsgálatok tyúkokon. [**Researches on Immunity in Fowls**].—*Allatorv. Lapok.* **54.** 173-175. 4 charts. [6 refs.]

In an attempt to demonstrate serologically the presence of immune bodies in the blood of fowls treated with fowl cholera immune serum, and also of substances which, it is assumed, prevent the prolonged effect of the serum, the author conducted a series of experiments leading to the following results :—

Fowl cholera serum produced from horses, if injected into fowls, is eliminated from the body within a period of from six to seven days, as indicated by the fact that no agglutinins could be detected in the blood later than the sixth day ; when subsequent injections were made, the agglutination titre became gradually lower and the agglutinins disappeared by the fourth or fifth day.

The disappearance of agglutinins appears to be correlated to the formation of precipitins which represent substances acting deleteriously on the proteins of the serum, and thus on the antibodies it contains ; during the first treatment percipitins appear on the sixth to seventh day while, after later injections, they can be demonstrated in the blood as early as the third to fourth day.

—A. KOTLÁN (BUDAPEST).

MUTERMILCH, S., & SALAMON, E. (1931). Sur l'immunité méningée passive et active. [**On Active and Passive Meningeal Immunity**].—*C. R. Soc. Biol. Paris.* **108.** 696-699. [13 refs.]

In agreement with RAMON, DESCOMBEY and BILAL and with others, the authors conclude from their own studies on haemolysins, agglutinins and antitoxins that the vasculo-meningeal barrier of man and of the rabbit is, in the normal state, impermeable or but little permeable to antibodies. They note, however, that a condition of abnormal permeability can be produced by intrameningeal injection of broth, milk, serum or flour emulsions and that their suggestion that this permeability should be used to secure penetration of antibodies from the general circulation has recently been carried out with incontestable success in syphilis, cerebrospinal meningitis and tetanus of man. They also conclude that from two to five injections of antigen (blood cells, bacteria, trypanosomes, rabies virus, anatoxins) into the meningeal cavity of the rabbit cause the formation of antibodies

in the general circulation as well as locally in the meningeal cavity.

— A. W. Stableforth.

Lumsden, T. (1931). **Tumour Immunity : the Effects of the Eu- and Pseudo-Globulin Fractions of Anti-Cancer Sera on Tissue Cultures.**—*J. Path. & Bact.* **34.** 349-355. 2 tables. [6 refs.]

The only reagents known to have a specific affinity for cancer cells in tissue culture, and not to affect normal cells, are anti-cancer sera made by inoculating the cancer of one species into a heterologous animal. The injection of such an antiserum into a cancerous animal is, however, without effect, probably because of the consequent excessive dilution of the antiserum. In the present paper efforts have been made to concentrate the antiserum and yet not to increase its toxicity to the inoculated animal. This result has been achieved since it is found that the euglobulin fraction contains all the antibodies which are specifically toxic to cancer cells whilst the pseudoglobulin fraction contains all the anti-species bodies. By such fractionation of anti-cancer serum, it can be concentrated tenfold and it is possible that this concentrated euglobulin fraction will be of service therapeutically. The euglobulin fraction is prepared by diluting the serum tenfold with distilled water and saturation of the solution with carbon dioxide at 0° C. The pseudo-globulin fraction was prepared by precipitation with ammonium sulphate and dialysation. It is advisable in carrying out work of the character described in the paper to take certain precautions, which are detailed in the text. The author concludes that his experiments demonstrate beyond all doubt the existence of antibodies having a specific affinity for cancer cells.—W. R. Wooldridge.

Sox, H. C., Azevedo, J. L., & Manwaring, W. H. (1931). **Parenteral Denaturization of Foreign Proteins. VI. Depolymerization, Homologization and Retention.**—*J. Immunol.* **21.** 409-415. 3 figs., 2 tables. [5 refs.]

Evidence is brought forward in support of the authors' views that intravenously injected horse proteins are partially depolymerized or hydrolysed in the normal canine circulation. It is suggested that this is followed or accompanied by a conversion of certain of these proteins or their derivatives into proteins of quasi-canine specificity.

These conclusions are based on results obtained by titrating 24-hour, ice-chest-separated sera from canine blood samples withdrawn at specified intervals after injection of horse serum. The results were read after two hours' incubation at 37° C. and standing overnight at 0° C., when the tubes were shaken to ensure uniform turbidity and the latter was estimated by comparison with a freshly prepared turbidity scale. By comparing these results with those obtained by titrating the canine sera samples prepared as above with (a) native rabbit antiserum, plus a half volume of normal canine serum, (b) 100 per cent. normal canine serum and (c) 95 per cent. normal canine serum plus 5 per cent. horse serum (representing the calculated 100 per cent. retention of undenatured horse proteins), the authors feel that their conclusions are justified. [The detailing of a larger number of experimental results would have strengthened their conclusions].

W. R. Wooldridge.

I. —. (1931). **The Problem of Allergy.**—*Brit. Med. J.* Dec. 19th. 1139-1140. [3 refs.]

II. Bordet, P. (1931). Contribution à l'étude de l'allergie. [**Contribution to the Study of Allergy**].—*C. R. Soc. Biol. Paris.* **107.** 622-623. [1 ref.]

III. Weil, J. A. (1931). Allergine et tuberculine. [" **Allergine** " **and Tuber-**

culin].—*Presse méd.* May 20th. 739-741. [24 refs.]

I. This is a review of three recently published books, namely :—(1) G. W. Bray. (1931). " Recent Advances in Allergy." London : Churchill. [12s. 6d.] ; (2) A. H. Rowe. (1931). " Food Allergy." London : Baillière, Tindall & Cox. [25s.] and (3) W. T. Vaughan. (1931). " Allergy and Applied Immunology." London : Kimpton. [21s.]

The first book is stated to be an accurate summary of the present state of our knowledge, clinical and experimental, of the problem of allergy.

The second book is of a different type. In order to ascertain what particular food is responsible for allergy, the author appears to have devised " elimination diets " designed to ascertain the particular food responsible. The diets are stated to be given in detail in the book.

The third book consists of an account of the general principles applicable to the treatment of allergy, and is considered to be comprehensible to the intelligent layman.

II. Bordet [(1931). *C. R. Soc. Biol. Paris.* **106.** 1251.] has previously described two phenomena which may occur in the guinea pig which has been vaccinated with BCG. An intraperitoneal injection of killed *Bact. coli* will cause the death of a guinea pig which has been sensitized to BCG. A subcutaneous inoculation of a killed suspension of *Bact. coli* will produce in a similar guinea pig a local lesion identical in its form and evolution with that described as Koch's phenomenon. Further tests have been carried out by the injection of 1 c.c. of a killed suspension of *Bact. coli* intravenously into tuberculous guinea pigs. Death has followed in several hours and it is stated that the reaction is similar to that when tuberculin is employed. A suspension of killed staphylococci or 1 c.c. of broth has no effect. It is also stated that old scars which are the result of previous tuberculin testing become haemorrhagic and congested after the injection of killed suspensions of *Bact. coli.* Somewhat similar reactions appear in guinea pigs previously inoculated with BCG.

It is suggested that the constant presence of *Bact. coli* in the digestive tract may in some way concern this phenomenon.

III. This appears to be a dissertation on the various extracts which have been obtained from time to time from the tubercle bacillus. One criticism concerns the publication of the treatment of tuberculosis with " allergine " by Jousset [(1929). *Presse méd.* March 16th. 353]. "Allergine" appears to be an extract prepared from virulent human or bovine tubercle bacilli, by grinding and freezing suspensions of the bacilli, from which the extract is freed by centrifugation. The amber-coloured supernatant fluid constitutes the " allergine." Weil maintains that treatment of tuberculosis with such a product is not a new method, neither is it devoid of danger and he cites the experiences of earlier workers with the various types of tuberculin and compares and emphasizes the similarity between " allergine " and tuberculin.—R. Lovell.

Calder, R. M. (1931). **A Microscopic Method of Typing Pneumococci by the Use of Stained Organisms.**—*J. Amer. Med. Ass.* **97.** 698-700. 3 figs. [4 refs.]

The method described consists of observing in hanging-drop preparations the reaction between small amounts of type serum and of the test material suitably stained with gentian violet. Agglutination is hastened by placing the slides on a shaking table for five minutes. The table is suspended by four coil springs and

receives periodic impulses from the alarm mechanism of a clock. Thirty-eight strains have been typed. The material was obtained from dextrose-blood-broth cultures, or by intraperitoneal inoculation of mice. In three cases the test was made with sputum itself.—A. W. Stableforth.

Zozaya, J. (1932). **The Standardization of Antimeningococcic Serum by the Polysaccharide Precipitin Test.**—*J. Infect. Dis.* **50.** 310-314. 3 tables. [5 refs.]

The polysaccharide precipitation method, which consists of incubating equal volumes of a 1 : 10,000 dilution of polysaccharide and falling dilutions of serum, is suggested as a means of standardizing antimeningococcic serum which has the advantage of giving results that can be compared with those of an accepted standard or of other workers. Comparison with animal protection tests is not practicable and the meningococcus polysaccharide is not type-specific, but group-specific. The author concludes, however, from work that has been done with sera of other kinds, that in general carbohydrate precipitation runs parallel with therapeutic potency.

Discrepancies exist between the results of agglutination and polysaccharide precipitation tests. In particular, serum concentration by Felton's water precipitate method may show an increase of precipitable polysaccharide corresponding to the concentration, but little or no increase of agglutinins. It is suggested that the agglutination test should be used to determine polyvalency, but not potency.

—A. W. Stableforth.

I. Sutliff, W. D., & Finland, M. (1932). **Antipneumococcic Immunity Reactions in Individuals of Different Ages.**—*J. Exp. Med.* **55.** 837-852. 1 fig., 2 tables. [31 refs.]

II. Finland, M., & Sutliff, W. D. (1932). **Specific Antibody Response of Human Subjects to Intracutaneous Injection of Pneumococcus Products.**—*Ibid.* 853-865. 4 figs., 1 table. [7 refs.]

I. This article is of some general interest in that it bears on the question of the origin of antibodies in normal subjects and their possible influence on subsequent infection and disease. The authors find that, in human beings, the incidence of bactericidal power for pneumococci varies with age. During the first ten days it is similar to that of the mother ; from 3 weeks to 15 months it is slight or absent ; it then increases until old age, when it drops slightly. It is not similar in regard to the three pneumococcal Types I, II and III. The incidence of other type-specific pneumococcal antibodies, and of skin reactions to acid precipitable proteins and to autolysates is also discussed.

II. In human subjects the simultaneous injection of the specific polysaccharides of all three types of pneumococci and of proteins and autolysates from Types I and II was followed by the appearance or increase of bactericidal power for pneumococci and, in most instances, by the appearance of mouse protective antibodies and agglutinins for one or more types. A single intracutaneous injection of 0·01 mg. of protein-free polysaccharide from Types I, II or III pneumococcus, or four similar daily injections, was generally followed by a specific increase of antibodies. Pneumococcus protein (0·1 mg.) did not produce any significant increase. Autolysates from virulent strains of all types were followed by a more or less general rise in bactericidal power and by the appearance of specific agglutinins and protective antibodies in about one third of the subjects.

—A. W. Stableforth.

DISEASES, GENERAL.

WEYGOLD. (1932). Die Blutfleckenkrankheit des Schweines. **[Purpura haemorrhagica in the Pig].**—*Zschr. Fleisch- u. Milchhyg.* **42.** 439-440. 2 figs. [1 ref.]

The author discusses purpura in swine from the meat inspection aspect, quoting from the works of NIEBERLE, GLÄSSER and VON OSTERTAG and outlines the important points in judging an affected carcass. Swine fever must be excluded and it is necessary to have a negative bacteriological finding for the swine erysipelas bacillus before making a diagnosis of purpura without complications. The flesh of affected animals is not to be condemned absolutely, [in Germany] but should be classed as inferior.—J. E.

KARMANN, P. (1932). Fütterschädlinge als Erreger von Krankheiten bei Haustieren. **[Food Pests as the Cause of Sickness in Animals].**—*Zschr. Infektkr. Haust.* **41.** 116-131. 3 tables. [38 refs.]

Deaths of fowls occurred after feeding on a certain mixed meal which on examination was found to contain large numbers of larvae of beetles and of *Ptinus fur* L. This meal was experimentally fed to 12 pullets, four of which died. Meal in which larvae of *Ptinus fur* were bred also proved toxic. Hay and loft sweepings containing mites (*Glyciphagus domesticus*) caused the death of rabbits, guinea pigs and white mice, while in all cases controls fed on sound food remained healthy.

The author points out that the food parasites may act as disseminators of bacteria or that their harmful effects, in some cases, may be due to the mechanical irritation of the intestine caused by their hard mandibles. He draws attention to the potential danger of slightly affected food stuffs if conditions become favourable for the multiplication of the parasites.—U. F. RICHARDSON.

JOHNSON, E. P. (1932). **A Study of Lymphomatosis of Fowls (Fowl Paralysis).**—*Virginia Agric. Expt. Sta. Tech. Bull.* No. 44. 6 plates, 4 tables. [16 refs.]

The author employs the term " lymphomatosis " to include the condition commonly termed fowl paralysis and visceral neoplasms, deducting, from the similarity of the cell infiltrations in nervous tissue to sarcomatous infiltrations, that the conditions are similar.

No evidence could be obtained that the disease is caused by a filtrable phase of an organism. Attempts to infect birds by lowering their vitality through coccidiosis failed. A higher incidence of fowl paralysis was obtained in chicks hatched from eggs from an infected flock than in control chicks. The progeny of two birds which recovered did not develop symptoms.—R. S. ROBERTS.

KING, Helen D. (1931). **Studies on the Inheritance of Structural Anomalies in the Rat.**—*Amer. J. Anat.* **48.** 231-260. 2 figs., 7 tables, 1 chart. [38 refs.]

Results are recorded of a series of breeding experiments designed for the purpose of determining whether certain structural anomalies which appear spontaneously in rats are somatic or heritable variations.

It is deduced therefrom that taillessness, which occurs in about 0·01 per cent., is a somatic variation due to an arrest in the development of the posterior end of the vertebral column.

Thyroid and parathyroid deficiency was observed only in a strain of captive grey rats, and since it occurred in thirteen generations of the strain the author suggests that the deficiency is probably transmitted from parent to offspring.

On the other hand anophthalmia, which was observed in about 0·1 per cent.

of rats, is not a heritable variation, but is due to some inhibition to the development of the eye during foetal life.

A strain of microphthalmic rats, developed from an anomalous individual which appeared in the fourth generation, was continued through nine generations, and comprised 1,884 individuals, of which 538 had one or both eyes deficient. Although more males than females exhibited the small-eye defect, the data set forth in a table suggests that there is no significant correlation of the defect with sex. The manner of inheritance of microphthalmus was complicated by the great amount of overlapping between normals and abnormals.—G. W. Dunkin.

PUBLIC HEALTH.

Rabagliati, D. S. (1931). **The Practical Value of Meat Inspection.**—*J. Roy. Sanit. Inst.* **51.** 652-658.

The author points out the value of meat inspection in safeguarding the public health, how far we are behind the other nations in this respect and the necessity for *ante-mortem* inspection in order to detect contagious disease and to trace it to its source. The detection of abnormal symptoms in live animals would lead to a special examination of the carcasses and organs which might not show any macroscopic evidence of disease. It would assist in the tracing of tuberculosis, e.g., where pig and calf carcasses are found affected, cows on the farm from which they come may also be found affected. Dangerous diseases such as anthrax would be detected before the animal is slaughtered ; this would avoid risk to the slaughterman and prevent spread of the infection. Unscrupulous persons can pay more for doubtful animals, if they are to be killed in slaughterhouses where hardly any inspection exists, than butchers who kill animals in public abattoirs where there is keen inspection, and this causes unfair competition. Inspectors who have to examine carcasses minus organs in a market have much difficulty in arriving at a definite decision and therefore all examinations should take place at the time of slaughter when all organs are present.

The author further points out that the recommendations issued by the English Ministry of Health are, in contrast with those in Scotland, without legal effect and also that, due no doubt to lack of pathological training of those carrying out the inspection, there is a lack of uniformity, the result being that meat may be passed in one district which would be seized in another area and *vice versa*. Butchers are required to notify local authorities of intention to slaughter and of any suspicious signs of disease in carcasses, but butchers are not trained in meat inspection and even when notification is given the local sanitary inspector is not always available, having too many other duties to perform.

In conclusion he states that veterinary officers have no legal jurisdiction to inspect meat according to the Public Health Acts, and urges that the recommendations of the Departmental Committee on Meat Inspection, regarding the appointment of veterinary inspectors to local authorities as expert meat inspectors, should be adopted without delay.—T. Dunlop Young.

Hollingworth, W. G. (1931). **Meat and Milk Hygiene.**—*J. Amer. Vet. Med. Ass.* **78.** 462-470.

In the first part of this article, the author deals with the advantages of a proper system of food inspection ; he believes that the veterinarian is so placed as to be of great service to the public in this respect. In the latter part of the article he deals with milk and meat inspection in considerable detail.

The butcher should possess a certificate of health from a physician. Meat should be examined only by veterinarians and should bear the inspector's stamp ; all condemned meat should be destroyed.

The author favours the abattoir system, since animals can be observed before and after slaughter and, in his experience, it has eliminated slaughtering on farms and has also proved a good investment to the packing companies interested [U.S.A.]

Referring to milk inspection, he emphasizes the difficulty of supplying such an enormous public with an adequate quantity of clean milk and discusses the possible ways of doing this. In certain districts routine examination of milk samples is carried out by qualified men in well equipped motor laboratories. Samples are collected at random in the streets and may have come from anywhere within a radius of 15 miles. In his own area handlers of raw milk, Grade A and Grade A pasteurized milk have to submit to tests for typhoid and diphtheria. He draws attention to the tendency to regard pasteurization as a substitute for sanitation and in conclusion refers to the growing menace of abortion bacilli and to contaminated milk as a cause of sore throat.—N. S. Barron.

I. —. (1932). **United States of America. Milk Control.**—*Lancet.* **222.** 99-100.

II. —. (1932). **American Methods of Milk Control.**—*Ibid.* 695-696.

I. During the last eight years persistent efforts have been made in the U.S.A. to unify methods and to raise the standard of milk production. Lack of uniformity has not been found to be economical. Within this period 44 municipalities, embracing some seven and a half million people in 25 States, have adopted the same standard of milk ordinance and work under the same system. From 1924 to 1930, 327 outbreaks of communicable disease, said to have been milk-borne, have occurred and of these 217 were typhoid fever.

The ordinance deals with farm conditions as well as with pasteurizing and distributing plants. Expert opinion is almost unanimous that all milk should be pasteurized. Tuberculin testing gives almost complete protection against tuberculosis ; stool and urine examination and Widal tests may eliminate most typhoid cases from employees, but none believe that such tests exclude all carriers. Opinion is divided as to whether pasteurization should be compulsory, and this can only be determined by health education of the people and by the local conditions of industry.

II. Compared with Europe, America is a country of milk drinkers. Wide publicity is given to the food value of milk. It is calculated by Professor Rosenau of Harvard that a quart of milk is equal as a source of energy to any of the following :— 2 lb. of salt cod fish, 3 lb. of fresh cod fish, 5 lb. of turnips, ⅛ lb. of chicken, 6 lb. of squash, 9½ oranges, 3 to 4 lb. of lean beef, 2 lb. of potatoes, 6 lb. of spinach, 7 lb. of lettuce, 4 lb. of cabbage, 8 eggs or 4½ lb. of lobster.

In milk control the Federal Government has no administrative authority, but nevertheless it exercises a very real and effective influence. Each city has wide powers, much more than in this country, and can make its own milk regulations. The Milk Ordinance is based on two main principles, the first being that all producers and distributors must hold a permit from the city health authority and the second that all milk sold must be graded and the container marked with the label of the appropriate grade. Each city has only local powers of inspection, but if a farmer in another area refuses to allow a city inspector to visit his premises, which he has a perfect right to do, his permit to sell milk in the city may be revoked.

There are officially eight grades of milk, namely :—Certified ; Grade A, raw

milk ; Grade B, raw milk ; Grade C, raw milk ; Grade D, raw milk ; Grade A pasteurized ; Grade B, pasteurized and Grade C, pasteurized. Grades D, raw and C, pasteurized, must be labelled " cooking only." In practice, however, a lesser number is usually adopted, for in many cities no raw milk other than certified is allowed to be sold. Pasteurization is given great publicity in America.

Defaulters are dealt with by two methods other than by court prosecutions, either by a withdrawal of the permit to sell milk, or by a de-grading of the defaulter's milk. The latter is most commonly adopted. If the producer then sells his milk as of a higher grade than that to which he is entitled, the court takes a more serious view than it does if he is proceeded against for selling milk without the necessary permit. Prosecutions are, however, rarely required.—D. S. Rabagliati.

I. —. (1931). **The Pasteurisation of Milk.**—*Lancet.* **220.** 1037-1038.
II. —. (1931). **Compulsory Pasteurisation.**—*Ibid.* **221.** 1376.
III. Stabler, Sally H. (1931). **The Electrical Process of Milk Pasteurization.** —*Amer. J. Hyg.* **14.** 433-452. 1 fig., 10 tables, 3 charts. [21 refs.]

I. Recent debates in Parliament and discussions in the press have shown that this country lags behind many others both in its consumption of milk and in the quality of the milk it consumes. In a leading article the *Lancet* refers to the " Memorandum on Bovine Tuberculosis in Man " recently issued by the Ministry of Health [see this *Bulletin.* **2.** 368]. The report declares that probably more than a thousand children under 15 die of bovine tuberculosis every year. Lord Moyniham is quoted as saying that 30 per cent. of tuberculosis in children in England is of bovine origin and that contaminated milk is responsible for 70 per cent. of the tuberculous diseases of bones and joints, and for some 60 per cent. of enlarged tuberculous glands in the neck ; while in Scotland 90 per cent. of glandular enlargement in the neck and 60 per cent. of the cases of bone and joint tuberculosis are ascribed to bovine infection from milk. The memorandum states that the proportion of milch cows in this country infected with tuberculosis is probably not less than 40 per cent.

The boiling of all milk is neither desirable nor feasible and pasteurization is not a method which can be applied by amateurs. The only way in which a dealer can render milk safe without unduly spoiling it as a food is by pasteurization. The article discusses pasteurization and shows that to be of value it must be thorough.

There are in existence a number of producers of certified and Grade A (T.T.) milk, who show that in practice it is possible to keep herds free from disease and to market milk—but at a price—safe for children without heat treatment.

There are two schools of thought ; one concentrates on compulsory pasteurization, the other regards pasteurization as a necessary, but unfortunate, makeshift, which if made compulsory would indefinitely postpone the attainment of the only end which it considers worth aiming at—the universal production of clean, raw milk.

The journal advocates Savage's scheme for enabling large local authorities to require all milk sold in their areas to be pasteurized. Whatever the immediate action advised, it is essential that the production of clean milk from healthy cows should be encouraged by all means. It is not recommended that the Government should set up a Royal Commission to enquire into the whole question of milk production as the matter is considered too urgent and important to be shelved in this way. Reference is made to the enquiry by the People's League of Health into bovine tuberculosis and its report is anxiously awaited.

II. Edinburgh and Glasgow Corporations have been in conference with a view to obtaining statutory powers to compel the pasteurization of all milk unless

from certified or tuberculin tested herds. A joint report on the subject has been submitted by the medical officer of health, the chief veterinary officer [GOFTON], and the chief sanitary inspector. There is no suggestion that the municipalities themselves should pasteurize milk, but that it should be done by private firms. They are agreed that certified and Grade A (T.T.) milk should be encouraged. It is suggested that there should be a conference on the subject by all the Scottish county and city associations.

III. The author describes an investigation carried out to compare, under carefully controlled experimental conditions, the efficiency of the electric process of pasteurization as compared with that of the holding method employed in most dairies. The electric method is essentially a flash process.

The commercial and experimental "electropure" units are described and the method of carrying out the experiments given in detail. The commercial temperature of 73° C. for the "electropure" process is compared with that of 62° C. for the holding method and also the action of the two processes at the same temperature of 62° C. The types and percentages of the organisms destroyed and those persisting after the processes, are compared and discussed along with the effect of the different methods on the cream line. The author comes to the following conclusions :—(1) electrical pasteurization at 73° C. is equally as efficient, both in reduction of bacterial count and in the kinds of organisms destroyed, as the holding method of pasteurization at 62° C. as used commercially ; (2) electrical pasteurization at 62° C., while it destroys the same types of organisms, does not reduce the bacterial count of milk to as great an extent as the holding method of pasteurization at 62° C. as used commercially ; (3) electrical pasteurization has no effect upon the total cream content of milk : it diminishes the rate at which cream rises, so that the milk seems to have more cream after 24 hours, and (4) electrical pasteurization has no effect upon the butter fat content.—D. S. RABAGLIATI.

BARTRAM, M. T. (1931). **The Effect of Pasteurizing Temperatures on (a)** *Brucella abortus* **and (b)** *Brucella abortus* **Agglutinins in Milk.**—*Cornell Vet.* **21.** 360-367. [17 refs.]

The author gives a brief preliminary survey of the literature dealing with the effects of pasteurization on *Br. abortus* present in milk. He carried out experiments to determine the effects of pasteurization at temperatures ranging from 140° to 145° F., for periods of from 5 to 20 minutes, on milk which had been either artificially inoculated with *Br. abortus* or to which suspensions of the organism had been added.

Tests for the presence of the organism in the milk after heating were made by the intraperitoneal inoculation (1 c.c.) of guinea pigs and by plating samples on Huddleson's liver infusion agar medium.

It was found that "certain porcine strains may not be destroyed by heating to 140° F. for 20 minutes to 142° for 30 minutes, nor to 145° for 15 minutes. One of the bovine strains survived 140° F. for 20 minutes and 142° F. for 30 minutes. A second bovine strain resisted 140° for 20 minutes, but not 142° for 20 minutes."

Pasteurization at temperatures of from 140° to 145° F. for 30 minutes appeared to have no effect on *Br. abortus* agglutinins contained in milk, but at higher temperatures there was a gradual reduction in the agglutinin content as shown by a fall in the agglutination titre.

The agglutinins were destroyed by heating at 170° F. for 10 minutes.

—T. M. DOYLE.

I. HADLEY, F. B. (1931). **Streptococcus epidemicus Infection in the Cow**

and its Relation to Milk-Borne Infections in Man.—*North Amer. Vet.* **12.** No. 9. 29-31.

II. Reis, J., & Swensson, Annita. (1931). Sur la flore streptococcique des mammites. [**The Streptococcal Flora in Mastitis**].—*C. R. Soc. Biol. Paris.* **107.** 645-646.

I. *Streptococcus epidemicus*, producing mastitis in cows, has been shown to be the cause of epidemics of sore throat in human beings, accompanied by such complications as erysipelas, arthritis, nephritis, otitis media, pneumonia and glandular enlargement. The author bases his diagnosis upon the isolation of *Str. epidemicus* from milk cultured on blood-agar and gives a full account of the properties of this organism. He regards bovine strains as identical with those of human origin.

The disease in the cow is not distinct from other forms of mastitis and can be produced experimentally by smearing the end of the uninjured teat with culture. The incubation period in this case is about 48 hours.

A greater number of cows and human beings are carriers than is commonly suspected and the number of inter-epidemic cases which occur favours the supposition that many of these harbour strains of low virulence. The author has diagnosed *Str. epidemicus* infection in 29 cows from ten different herds within the last two years, but in only two instances was there any association with an epidemic of sore throat. Such affected cows should be sold for beef as few recover completely.

A typical outbreak of acute streptococcal mastitis (*Str. epidemicus*) in Wisconsin is described ; in this instance, human infection was prevented by pasteurization.

II. The authors give a full description of the morphology, cultural characteristics and haemolytic and biochemical properties of 54 strains of streptococci isolated from typical cases of mastitis in various parts of the state of Sao Paulo. They found that in such cases the streptococcal flora were heterogenous, but no particular species could be incriminated. They did not encounter the *Str. mastitidis* described by American bacteriologists.—N. S. Barron.

Thomsen, C. S. (1932). **Tuberculosis and the Milk Supply.**—*Brit. Med. J.* Aug. 6th. 273.

The author explains to a correspondent the system of controlling the sale of tuberculous meat and milk in Belfast, and points out why the number of convictions for unlawful sale of such commodities in a tuberculous condition is no criterion of the incidence of tuberculosis in the raw material prepared for market.

—Norman Hole.

I. Schoop, G. (1932). Die grossen Schafschlachtungen in Island. [**The Great Sheep Slaughters in Iceland**].—*Deuts. tierärztl. Wschr.* **40.** 14-15. 4 figs.

II. Rommel. (1932). Schlachthofanlagen in kleineren Gemeinden. [**Slaughter-House Construction in Small Townships**].—*Ibid.* 141-143.

III. Klimmeck. (1932). Die lebensmittelpolizeilichen Bestimmungen für den Handel mit Eiern und geschlachtetem Geflügel. [**Public Health Food Regulations for the Trade in Eggs and Poultry**].—*Ibid.* 173-175.

I. A description of the annual autumn gathering of sheep from the highlands, sorting them out by their owners and selection for slaughter. From the 20th September to the end of October more than 400,000 sheep are slaughtered. The carcasses are refrigerated, pickled or worked up into tinned food or sausages and a small quantity used as fresh meat. The slaughterhouses are all the property

of the Farmers' Unions ; meat inspection is by the four veterinary surgeons of Iceland, aided by medical men. Mutton is the staple flesh food, very few cattle being slaughtered, and pork is a rarity. Very little disease is met with, though there are a few cases of braxy. Echinococcus, formerly frequently found, is now very rare.

II. The burgomaster of Balingen describes the financial difficulties of building a new slaughterhouse for a small town of 4,000 inhabitants. Having reduced the requirements to an absolute minimum, the article states in detail what was finally provided, how much it cost and how many animals are dealt with annually.

III. A discussion of food control rules to comply with the German Food Laws in respect of the egg and poultry trade both within Germany and in respect of imported and exported products. A classification of the conditions which make them dangerous to public health is given. In regard to poultry the following defects should involve condemnation :—

Observed in the live animal—infectious and parasitic disease, blood and digestive diseases, poisoning.

Observed *post-mortem*—" stuffy-maturing," putrefaction, moulds and mildew, changes in smell and taste.—F. BULLOCK.

THERAPEUTICS.

I. SEELEMANN, M. (1932). Die Galtbehandlung, ein erfolgversprechendes und segenreiches Arbeitsgebiet für den praktischen Tierarzt. [**The Treatment of Mastitis, a Successful Field of Work for the Practitioner**].—*Tierärztl. Rdsch.* **38.** 577-579 and 596-601. [7 refs.]

II. STECK, W. (1932). Die Galtbehandlung. [**The Treatment of Mastitis**]. —*Ibid.* 689-690.

III. STECK, W. (1932). Die Wege der praktischen Galtebekämpfung in experimenteller Beleuchtung. [**The Way to Combat Mastitis as indicated by Research**].—*Schweiz. Arch. Tierhlk.* **74.** 480-488. 6 tables. [33 refs.]

I. This is an argument against the view that infected udders cannot be freed of streptococci. After two years research in the chemotherapy of streptococcal mastitis, the author has found that udder infusions with solutions of two proprietary drugs (called rivanol and entozon) combined with strict hygienic measures, can eradicate the infection from a herd of dairy cows. The author's opinion is based upon the results obtained with three large herds comprising some 240 cows. Failure is certain, however, unless the work is done thoroughly : isolation of affected cows and continuous co-operation with a bacteriological laboratory are of the greatest importance. [The technique of the udder infusion treatment is given in this *Bulletin*. **3.** 101].

II. Steck comments here on a reference to his work made by SEELEMANN above : it concerns the employment of " stimulation therapy," which the author found of some contributory assistance in mastitis therapy.

III. The author cites several examples of the incidence of mastitis in herds of dairy cows as illustrations of the epidemiology and clinical course of the disease in both treated and untreated animals. The important factors concerned are the virulence of the streptococci involved, the idiosyncrasy of the animal and phase of milk secretion. The course of infection in a herd of untreated cows can manifest itself by all types of mastitis in the various animals and in particular animals it often varies in severity at different times.

Vaccination, even with herd-specific vaccines has proved very unreliable in

the author's hands, but chemotherapy (udder infusions with certain acridine preparations as used by SEELEMANN) combined with efficient stripping, hygienic measures and bacteriological control is the best means yet available for curative and eradicative purposes.—J. E.

SEEKLES, L., SJOLLEMA, B., & VAN DER KAAY, F. C. (1931). Die Wirkungsweise des Calciums. I. Mitt: Die Wirkung von intravenösen Calciumsalzeinspritzungen auf das Herz von Rindern mit gestörtem mineralem Regulierungsmechanismus. Die Abhängigkeit des Herzwirkung des Calciums von der mineralen Zusammensetzung des Blutserums. II. Mitt: Antagonistische Herzwirkung von Calcium und Magnesium bei normalen Kälbern. III. Mitt: Die antagonistische Herzwirkung von Calcium und Magnesium bei Rindern mit gestörtem mineralen Regulierungsmechanismus. IV. Mitt: Der Calcium-Magnesium-antagonismus in der Magnesiumnarkose, nach Versuchen an jungen Kälbern. V. Mitt: Das autonome Gleichgewicht im Rinderorganismus in Beziehung zu der Zusammensetzung des Blutserums bei experimenteller und pathologischer Hypokalzämie. Ein Beitrag zur Kenntnis der Giftwirkung von Oxalsäure-und Citronensäuresalzen nach intravenöser Einspritzung. [**Physiological Action of Calcium. I. The Effect of Intravenous Injections of Calcium Salts on the Heart in Cattle with Abnormal Mineral Metabolism. The Dependence of the Effect of Calcium on the Heart upon the Mineral Content of the Blood Serum. II. The Antagonistic Action of Calcium and Magnesium on the Heart of Normal Calves. III. The Antagonistic Action of Calcium and Magnesium on the Heart of Cattle with Abnormal Mineral Metabolism. IV. Calcium-Magnesium Antagonism in Magnesium Narcosis in Young Calves. V. Autonomous Equilibrium of Cattle in Relation to the Composition of Blood Serum in Experimental and Pathological Hypocalcaemia. Toxic Action of Intravenous Injections of Oxalates and Citrates**].—*Biochem. Zschr.* **243.** 316-329. **244.** 1-4, 5-8, 167-176 and 258-267. 4 figs., 16 tables. [20 refs.]

[VAN DER KAAY did not have a part in the authorship of IV].

I. In a previous paper [(1930). *Biochem. Zschr.* **242.** 358.] it was shown that the values for magnesium, total calcium, diffusible calcium and inorganic phosphorus of serum of healthy cattle, of cattle suffering from milk fever, and of cattle with grass tetany are different. In the present paper it is shown that calcium chloride injections into cattle suffering from either of these diseases produce the same heart effects, viz. alteration in the frequency, which is sometimes greatly increased, with blocking, during and soon after injection. In milk fever the effect varies with the initial calcium and phosphorus contents of the blood; if the serum is low in calcium and high in phosphorus, dangerous changes in frequency tend to follow whereas harmless changes result if the calcium is high and the phosphorus low. It is concluded that heart block and systolic arrest could be prevented in this disease by the injection of suitable mixtures of calcium and magnesium chlorides. In grass tetany there appears to be no connection between the initial mineral composition of the blood and the effect of calcium chloride injections.

II. The effect of intravenous injection of magnesium chloride in young calves is similar to that of calcium chloride, but a mixture of the two salts (4 parts calcium chloride crystals and 1·5 parts magnesium sulphate crystals) is much less injurious.

III. The lowered toxicity of calcium chloride when mixed with magnesium

is shown to hold with cows having abnormal mineral metabolism.

IV. Intravenous injection of magnesium salts in 3 to 5 day old calves does not induce narcosis in spite of the lowering of the serum Ca/Mg ratio to 1 or even to 0·58. If, however, the serum calcium be first decreased by injection of oxalate, then intravenous injection of magnesium causes a short (few minutes) narcosis. The period of narcosis may be increased by the simultaneous injection of magnesium sulphate and magnesium oxalate. Subcutaneous injection of magnesium sulphate, without previous injection of magnesium oxalate, produces narcosis.

V. The decrease of the blood-calcium reaches its maximum in cattle in a few minutes after the intravenous injection of sodium oxalate. The extent of the decrease and of its toxic effects are relatively greater in cows than in young calves. 30 to 40 per cent. of the serum calcium is in a non-ionized form and this is only incompletely precipitated, and with difficulty, even when an excess of oxalate is injected. The precipitation of only a small proportion of this non-ionized calcium leads to death. A decrease of from 10 to 15 per cent. of the magnesium and inorganic phosphorus of the serum usually follows oxalate injection. Intravenous injection of sodium citrate has no effect on the serum calcium.

—W. R. Wooldridge.

Schmidt, J. (1931). Die Verfütterung von Jod an Geflügel. [**The Feeding of Iodine to Fowls**].—*Deuts. tierärztl. Wschr.* **39.** 754-755.

The author discusses the known physiology on the effect of iodine administration to poultry. Domestic fowls are more resistant than mammals to overdosage. Iodine given to laying hens passes partly to the eggs and as a consequence their keeping properties are increased. The author disagrees with those who believe that iodine is particularly beneficial to poultry. His experiments appeared to indicate that iodine given *per os* diminishes ovarial activity.—J. E.

Graf, H., & Paschke, H. (1932). Weitere Beiträge zur Pharmakologie am isolierten Uterus des Rindes.—Novocain. [**Further Contributions to the Pharmacology of the Isolated Bovine Uterus.—Novocaine**].—*Arch. wiss. prakt. Tierhlk.* **65.** 285-293. 3 figs. [25 refs.]

This is one of a series of articles dealing with the effects of drugs on the isolated living uterus. The object here was to find in what way novocaine affects the uterus when given epidurally. Uteri were obtained from 38 slaughtered cattle, the majority non-pregnant, and their natural and drug-influenced movement observed graphically, using a kymograph. In some cases novocaine-pilocarpine or novocaine-barium chloride were employed. It was found that novocaine paralyses the uterus when directly applied in solution to the uterus preparation (in a nutrient fluid bath). [Whilst being a careful contribution to the pharmacological study of novocaine, the results of this work are not applicable in practice to the subject of epidural anaesthesia of parturient animals, as claimed by the authors].—J. E.

PHYSIOLOGY.

Scheunert. (1931). Vitamingehalt der Futtermittel. [**Vitamin Content of Foodstuffs**].—*Deuts. tierärztl. Wschr.* **39.** 749-750.

This paper was presented at the sixth meeting of Workers on Diseases of Breeding Animals held at Leipzig in October.

It gives an outline of the vitamin content of common animal foods. Vitamins

A, B and D are necessary for healthy animal life, but experiments have indicated that vitamin C is not an essential item in food for ruminants, horses and fowls.

Vitamin A is present in ample amount in all fresh grasses and legumes; it is particularly rich in lucerne and clover. Different grasses vary considerably in their vitamin A content, but this fact has no great practical significance. The vitamin in grasses is not destroyed in the preparation of ensilage nor in drying. Carrot and beetroot, fresh or dried, and linseed are also good sources of vitamin A. In practical dietetics grass and hay provide ample sources of vitamin A for farm animals.

Vitamin B is not so extensive in ordinary foods as vitamin A, but it is found in adequate amounts in grass, hay and silage, in dried beetroot, bran and potato. Oats are very rich in vitamin B.

All green plants except fresh roots are rich in vitamin C, but hay contains none. Potato, both fresh and cooked, late turnips and cabbage are rich in vitamin C; the content of other roots, including carrots and beetroots, is rather poor. This vitamin is not destroyed in ensilage.

Vitamin D is very variable in fresh grass and more evident in hay. No other common foodstuff contains it in an adequate amount and an artificial supply is, therefore, necessary. Lebertran and vigantol are very valuable in this respect.—J. E.

I. McClure, F. J., & Mitchell, H. H. (1931). **The Effect of Calcium Fluoride and Phosphate Rock on the Calcium Retention of Young Growing Pigs.**—*J. Agric. Res.* **42.** 363-373. 1 fig., 4 tables. [17 refs.]

II. Wilgus, H. S., Jr. (1931). **The Quantitative Requirement of the Growing Chick for Calcium and Phosphorus.**—*Poultry Sci.* **10.** 107-117. 2 figs., 4 tables. [9 refs.]

I. Raw rock phosphate, when used as a mineral supplement to diets, usually has a deleterious effect. This is generally considered to be due to its fluorine content. In this paper experiments are described in which fluorine was fed to pigs either in the form of the rock salt or as calcium fluoride. It is shown that mineral supplements containing 2 per cent. or more of fluorine exert a detrimental effect upon the food consumption and growth of pigs, the amount of calcium fed being 5 g. daily. The rock phosphate seemed to be somewhat more harmful than a mixture of calcium phosphate and calcium fluoride containing the same amount of fluorine. High levels of fluorine appear to depress calcium metabolism, but not to affect it during intermittent periods of feeding. It is concluded that it is inadvisable to supply the entire calcium requirement of pigs by rock phosphate. Its use is not recommended to supply even one third of the necessary calcium.

II. Growing chickens, separated into ten pens, were kept on a basal diet of 58·5 parts of yellow corn meal, 20 parts of flour wheat middlings, 20 parts of dried skim milk, 0·5 part of salt and one part of cod liver oil of known anti-rachitic potency. Variable quantities of calcium phosphate and of calcium carbonate were fed in addition to the different pens. The results of these experiments were measured by growth, occurrence of rachitic lameness, percentage of bone ash and quantity of calcium and phosphorus in the bone ash and also in the blood serum. From these experiments it appears that, provided that the optimum supply of the anti-rachitic factor is given, the calcium requirement of the growing chick approaches a minimum level of 0·66 per cent. Under similar conditions the requirement of phosphorus is about 0·5 per cent. of the ration. The calcium-phosphorus ratio may vary between 1·0 : 1 and 2·2 : 1 with normal results. A ratio of 2·5 : 1 is at the limit whilst one of 3·3 : 1 is disastrous. In the majority

of rations fed to chickens under normal conditions the minimum limits of calcium and phosphorus are usually more than supplied.—W. R. Wooldridge.

TECHNIQUE.

I. Székely, B. (1931). Vizsgalatok a kevés agart tartalmazó tenyésztóanyag használhatóságáról. [**Investigations on the Use of Culture Media containing Small Amounts of Agar**].—*Közl. összeh. élet.* **24.** 376-382. 2 text figs.

II. Schuetz, F. (1931). További vizsgálatok a bakteriumtenyészetek nyulóssá válásának feltételeiröl. [**Further Studies on the Conditions which cause Cultures of Bacteria to become Viscid**].—*Ibid.* 433-436

I. It has been shown by Hitchens that culture media containing small amounts (0·1 to 0·2 per cent.) of agar may be used for the cultivation of both aerobic and anaerobic bacteria. While it was assumed that the anaerobic property of such media is based mainly upon the peculiar consistency and distribution of the agar particles preventing the penetration of air into the medium, the author found that this may also be due to another factor, i.e. to the sugar content of the medium which, as a reducing agent, may use up the oxygen of the penetrated air.

In the course of his investigations the author slightly modified Hitchens' method of preparing culture media with small amounts of agar, using a broth of normal instead of double concentration, to which agar was added in quantities as required. Hitchens' medium proved not only well adapted both for primary cultivation of anaerobic bacteria and for their artificial enrichment, but also it yielded valuable results in the cultivation of various aerobic bacteria.

II. Five strains of *Bact. equirulis* were subjected to growth on various culture media (ordinary broth, broth fermented by *Bact. coli*, etc.) to which a series of carbohydrates and alcohols was added. The cultures were examined daily. In harmony with earlier observations made by Manninger and Kómár [(1930). *Közl. összeh. élet.* **23.** 271.] concerning the changes of *Pasteurella aviseptica* cultures under varying pH conditions, it was found that cultures of *Bact. equirulis* while preserving their characteristic viscosity when no fermentation of the carbohydrates occurred, i.e. in media with a pH close to 7·0, gradually lost their viscid consistency and became more or less flocculent with the increase of acidity.

It was further observed that, following an artificial alteration of the pH of *Bact. equirulis* cultures, their consistency could easily be changed, i.e. viscid cultures, if treated with 1 per cent. lactic acid, became flocculent, while cultures showing a flocky consistency, if treated with a 2 per cent. solution of sodium hydroxide, acquired, though less promptly and completely, a viscid consistency.

The author concludes with the statement that on account of the above results it seems safe to assume that the viscosity of cultures of a given bacterial species should be looked upon as a characteristic feature only when observed in culture media free from reducible carbohydrates and other compounds.

—A. Kotlán (Budapest).

Pacheco, G., Maciel, J., & Penha, A. (1931). Sur la coloration des Bacilles achrorésistants acido-résistants. [**On the Staining of Acid-Fast Bacilli**]. —*C. R. Soc. Biol. Paris.* **107.** 650-652. 1 table. [1 ref.]

The authors object to the term "acid-resistant" because the bacteria to which it is applied are also alcohol-fast and alkali-resistant and they have coined the term "achrorésistant." They object to the treatment of films by ether or xylol as these sometimes remove substances involved in the "achrorésistant"

property. A similar objection is raised to the application of heat and they point out that films may be stained by a longer application of the stain without heat.
—R. Lovell.

Ponder, E., & Saslow, G. (1931). **The Measurement of Red Cell Volume. III. Alterations of Cell Volume in extremely Hypotonic Solutions.**—*J. Physiol.* **73.** 267-296. 4 figs. [24 refs.]

In a previous paper [(1928). *J. Physiol.* **70.** 169.] the authors showed that red cells may increase in volume in hypertonic media, or may not decrease in volume as much as expected. In that paper the tonicity of the plasma was varied from that equivalent to 2 per cent. sodium chloride to 0·8 per cent. sodium chloride. In the present paper the methods were modified and developed to allow the cell volume to be measured to within an error of 2 per cent. in hypotonic solutions. The basis of the method depends upon the use of a diffractometer of new design, the theory and practice of which is fully described.

From experiments with rabbit red cells it is shown that lysis occurs when the cell volume is increased by one third, but that, contrary to expectation, the concentrations of sodium chloride, potassium chloride and glucose that effect this volume change are not equivalent. In order to explain these results on the assumption that the cell is a perfect osmometer it is necessary to assume that the " free " water is 50 per cent. of the total when the cells are in the saline solutions and is only 25 per cent. of the total when the cells are placed in glucose solutions. But it is known that the amount of " bound " water is only about 10 per cent. of the total water content [Hill, A. V. (1930). *Proc. Roy. Soc. Ser. B.* **106.** 447.] and therefore the cell cannot behave as a perfect osmometer. It is suggested that this behaviour is explained by the escape of osmotically active substances from the cell to varying extents depending upon the nature of the external medium. This explanation removes the principal difficulty in osmotic theories of hypotonic haemolysis, viz. that the same amount of lysis may be brought about by solutions of widely differing osmotic pressures.—W. R. Wooldridge.

Rose, A. R., & Schattner, F. (1931). **Preservative for Small Blood Samples sent through the Mails.**—*J. Biol. Chem.* **92.** Proc. xvii-xviii.

A procedure for minute blood volumes for sugar tolerance tests to be sent by post for examination has been devised by the authors. A mixture of 15 gm. of sodium sulphate crystals and 20 mg. of sodium fluoride is heated in a glass dish. The water of crystallization dissolves both salts and is evaporated and the residue ignited. The powdered desiccant is measured into glass tubes and blood from a prick is measured accurately and transferred to the powder, and stirred with a rod permanently attached to the tight-fitting rubber stopper of the tube. On arrival at the laboratory a deproteinizing solution is mixed with the sample and the blood sugar determined in the filtrate. Samples set aside for from a few days to months have in the majority of cases not varied more than 5 per cent.
—R. Lovell.

Nicholson, A. J. (1931). **Methods of photographing Living Insects.**—*Bull. Entomol. Res.* **22.** 307-320. 5 figs., 10 plates.

This article describes in detail the apparatus and technique developed by the author for the purpose of taking photographs of insect life. The small size and activity of many insects, combined with the inadequate materials at present available, make such work difficult and an apparatus which can be focussed accurately up to the moment of releasing the shutter is required. The author uses a

hand camera with a long extension bellows ; a telescope is attached to the side which is modified in certain respects to permit the operator to focus rapidly and accurately.

For purposes of enlargement it is preferable that photographs be taken at a reduced magnification with a consequently greater depth of focus ; the exposure is, however, the most important item (not longer than 1/50th and preferably 1/100th second). The author adheres to the old adage " exposure for the shadows." A useful piece of apparatus for use with the outfit is an aluminium reflector with a layer of foil on the one side and a polished surface on the other as this gives a more diffuse reflection.

Some interesting advice is given concerning the taking of flashlight photographs in the laboratory and in the field. The apparatus and technique in this case are more simple. An aperture of *f*22 or *f*32 can be used and panchromatic plates have been found to give excellent results.—N. BARRON.

OFFICIAL AND OTHER REPORTS.

I. LEAGUE OF NATIONS. (1931). **Report of the Permanent Commission on Biological Standardization.** pp. 78. London : George Allen & Unwin, Ltd. [8vo.] [1s. 6d.]

II. —. (1931). **International Vitamin Standards.**—*Brit. Med. J.* Nov. 7th. 857-858.

I. A valuable report giving the results of investigations upon the standardization of biological products, carried out under the auspices of the League of Nations. A number of standards are recommended and have been set up and allocated to various institutes. Among these are included standards for gas gangrene (*Clostridium welchii*) antitoxin, tuberculin, antiscarlatinal serum and certain of the vitamins. It recommends that further investigation be made in order to discover whether certain other standards can be adopted for such products as gas gangrene (*Cl. septique*) antitoxin, a formol toxoid or anatoxin as diphtheria prophylactic, products of use in veterinary therapeutics and sex hormones. It further lays down certain conditions for the testing of a toxin to be used in the Schick test. Standards are recommended for the fat soluble A vitamin, the antirachitic vitamin D, the antineuritic vitamin B (also known as vitamin B_1), and the antiscorbutic vitamin C. As standard for vitamin A, carotene is recommended, but a selected sample of cod liver oil is to be kept as a possible second standard. The recommended standard for vitamin D is a solution of irradiated ergosterol. For vitamin B_1 the standard adopted is an adsorption product of this vitamin on Fuller's earth. The fresh juice of the lemon, *Citrus limonia*, is recommended as the international standard for vitamin C. The details of the method of preparation, storage and distribution of these standards are described and in certain instances conditions for their use are recommended. A revision of these standards is to take place at the end of two years.

II. An editorial upon the recommendations for the adoption of international standards and units for four of the known vitamins. The practical outcome of the recommendations is in the hands of clinicians, as now that the units have the same meaning in all countries comparable clinical data ought soon to be available for determining the effective and safe dosage of each of these vitamins in its different applications.—W. R. WOOLDRIDGE.

NORTHERN RHODESIA. (1932). **Annual Report of the Department of Animal**

Health for the year 1931. [SMITH, J.] pp. 44. Livingstone : Government Printer. [fcp.]

Since 1930 two additions have been made to the veterinary staff, bringing the total to ten, two being research officers. The position with regard to the use of dipping tanks continued to improve. Rather bad drought early in the year necessitated the moving of cattle to low ground adjoining the Kafue river, where the risk of anthrax and tick and fluke infestation was considerable : the net gain, however, was obvious. The improvement in European-owned stock is disappointing and many owners do not make use of high-grade bulls which are available. Native-owned stock shows no improvement, mostly because the natives do not take sufficient interest in the quality of their stock even though they are chiefly dependent upon livestock for their livelihood. In any case, imported stock from Southern Rhodesia, the trade in which is temporarily held up on account of foot and mouth disease in that country, is a severe competitor with which Northern Rhodesia farmers have to contend. The pig and sheep industries show signs of expansion, though the outlook is not too favourable.

The Deputy Director of Animal Health [MORRIS, J. P. A.] surveys the disease situation. Although Northern Rhodesia is adjacent to territories in which rinderpest, foot and mouth disease and east coast fever exist, it was kept free from these scourges by an efficient quarantine system for imported animals, whilst contagious bovine pleuro-pneumonia was confined to the Barotse province by police control.

An increase in the number of anthrax outbreaks was reported for the year, but the situation was not unduly threatening ; blackleg was less prevalent ; contagious abortion caused no great anxiety, infected herds having apparently acquired a high degree of natural immunity. Bovine tuberculosis was suspected to be spreading outside the Fort Jameson district to which area it has been restricted hitherto. Apart from its general importance, trypanosomiasis requires special attention in connection with certain industrial undertakings in which ox transport is used and one timber business had to close down because of the disorganization caused by this disease. Tsetse fly control is an important matter and emphasis is laid upon the need for a separate departmental organization to deal with it. Rabies exists and requires constant attention.

Anaplasmosis and piroplasmosis are prevalent. The indigenous stock possesses a considerable amount of immunity and shows a low mortality. If five-day dipping with the dip at ordinary strength at the beginning of the tick season and regular dipping throughout the year is carried out, there is very little danger of loss. Subcutaneous injections of quinine bi-hydrochloride when given in the early stage of infection appear to have a beneficial effect on affected animals.

The existence of heartwater in Northern Rhodesia is now definitely established. Ephemeral fever was more prevalent than usual. Most of the cases were of a mild type. Horse sickness has constantly to be guarded against.

As in the report for 1930, a table showing the incidence of the more important diseases is given.—J. E.

NORTHERN RHODESIA. (1932). **Annual Report of the Veterinary Research Officer for 1931.** [MACDONALD, R. A. S.] *Ann. Rep. Dept. Anim. Health. 1931.* pp. 23-44. Livingstone : Government Printer. [fcp.]

The report opens with a list of material sent in for diagnosis giving the results obtained and one showing the quantities of biological products issued monthly (anthrax and quarter-evil vaccines). The result of much of the research work is shown in appendices dealing with the following subjects :—catches of insects in a fly trap at the station, and at Bombwe ; helminths collected from mammals

and birds in the Mazabuka area (given under host headings and parasite sub-headings); identifications of local plants; tests on toxicity of numerous plants for cattle and sheep; a list of plants established in the station garden; and the results of block tests [live and dead weights of dressed carcasses and parts thereof] of various breeds and crosses of cattle.

TRYPANOSOMIASIS.—Two trypanosomes, *T. vivax* and *T. congolense* have been established in animals at the station. A mixed invasion of *T. congolense* and *T. brucei* was found in a horse which is under treatment.

ANAPLASMOSIS AND PIROPLASMOSIS.—Strains of *A. marginale* and *Babesia bigemina* are both established in reservoir animals.

THEILERIASIS.—*T. mutans* infection broke out in some pedigree animals and was overcome by five-day dipping, seven-day dipping having been found ineffective for killing adult male *Rhipicephalus* ticks.

RABIES.—It was found experimentally that the incubation period, after intramuscular inoculation of brain material into guinea pigs, was from 20 to 27 days and, after subdural inoculation into rabbits, 20 days.

A short note is given on tick pyaemia of horses and senkobo skin disease of cattle, the aetiology of both of which is obscure.

The results of entomological, helminthological and botanical work are given in appendices.

SHEEP DISEASES.—A few cases of the following were observed :—an apparently specific gangrenous broncho-pneumonia, tick paralysis in lambs, *erythema contagiosa*, myiasis (nostril fly) and arsenical poisoning.

FOWL DISEASES.—Fowl typhoid, chicken pox, leg weakness and infestation with air-sac mites (*Cytodites nudus*) were common.

In addition to the above, work on animal breeding and nutrition was performed.—J. E.

BOOK REVIEWS.

SCHÖNBERG, F. [Polizeiveterinärrat and Chief of State Food Inspection at Berlin]. (1932). Die Untersuchung von Tieren stammender Lebensmittel. **[The Examination of Foodstuffs of Animal Origin].** pp. vi + 90. 18 figs. Berlin: R. Schoetz. [8vo.] [RM. 5. 60.]

This is a concise and systematic manual on methods for inspection of food derived from animal products and covers the range of food materials as now consumed by the German nation. It is therefore not complete for other nations, but of course applies to every country as regards its main lay-out.

The technique of the various methods of testing food material is clearly described and the illustrations further assist in their exposition. In addition, actual instances of special examinations of suspected material performed by the author are frequently given: this should be a great help to the student of food inspection.

This handy booklet is well printed and the illustrations are perfectly clear.

—J. E.

BRITISH MUSEUM (NATURAL HISTORY). (1932). **Instructions for Collectors. No. 12. —Worms.** pp. 22. 19 figs. London: Wm. Clowes & Sons Ltd. [8vo.] [6d.]

This is a useful booklet giving instruction on the collection and preservation of all kinds of helminths. The habitat of the commoner species is described and also the correct method of treatment before despatch to a museum for identification, etc.

This booklet with its several excellent figures is indispensable to collectors.

—J. E.